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A composite picture showing the numerous methods by which passengers and goods are carried to-day.

WINSTON'S
CUMULATIVE LOOSE-LEAF
ENCYCLOPEDIA
A COMPREHENSIVE REFERENCE WORK

EDITOR-IN-CHIEF

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In Ten Volumes

ILLUSTRATED WITH PHOTOGRAPHS, MAPS, DRAWINGS AND COLOR PLATES; INCLUDING SEVEN COLOR PLATES FROM THE J. L. G. FERRIS COLLECTION OF AMERICAN HISTORICAL PAINTINGS, BY SPECIAL PERMISSION OF THE ARTIST

THE JOHN C. WINSTON COMPANY

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PREFACE

THE range of human knowledge in our days has grown enormously. Added to by travel, discovery, invention and scientific investigation, its scope has passed vastly beyond that of past times and it is still increasing with accelerating rapidity. The period in which a man could seek to make all knowledge his field, as in the days of Aristotle, now belongs to the distant past, and the most ardent student of our day fails to gain an exhaustive grasp of more than one branch on the great tree of knowledge. The vast majority fall far below this level and are obliged to be content with a general acquaintance with what is going on in the world of nature, art and science.

This is the function of an encyclopedia, to gather up the multitudinous bits of information of interest to mankind and put them in shape to be digested by the ordinary searcher after knowledge. Even the profound students of our day feel the necessity of such a compendium of facts, since there are thousands of items outside their chosen fields of study with which they are unfamiliar and which it is important to know. An encyclopedia is like a ship deeply freighted with many varied items adapted to everyday needs. It is at once a gazetteer, a biographical dictionary, and a compendium of the facts of science, philosophy and all the fields of intellectual activity, alike those of the past and those of recent development, making the world its province, and all knowledge its scope. It is its object to gather in the material facts on every subject, while omitting the non-essentials, and to give the reader a lucid and concise statement which will supply him with a fair and ordinarily sufficient digest of every subject sought.

This is the day of the encyclopedia. Readers want facts of every kind boiled down and bottled up for ready use, clearly stated, conveniently arranged, and giving without needless detail just the things that busy men and women want to know. They also want what they do not get in the ordinary encyclopedia, a light, handy, inexpensive work, instead of a long series of bulky and costly volumes, twenty or thirty in number and large and heavy to handle, ponderous in size, while containing no more information than, with careful editing, can be compressed into a work of the size and convenience here offered to the inquiring reader.

WINSTON'S CUMULATIVE LOOSE-LEAF ENCYCLOPEDIA, in fact, fills a long-felt want of the reading public. It occupies a field of its own, and is without a rival in its peculiar combination of conciseness with completeness. It must not be imagined that moderate dimensions have been gained by incomplete treatment and a brevity of subjects. An analysis of this work will prove the contrary. It covers nearly 40,000 subjects, giving under each subject the points that are most important to know. It has been the aim of the editors of this work to include every subject that properly comes within the scope of an encyclopedia, not those words the proper place for which is in a dictionary, nor those recondite subjects that appeal merely to the learned specialist and belong only to the pages of purely technical volumes. This work is intended, not for the few learned professors, but for the host of men, women

and children who are not interested in exhaustive treatises, but are seeking to gain some fair idea about the multitude of everyday subjects, the topics that arise in ordinary conversation or that they meet with in their reading, and about which they desire some definite and satisfactory information. An encyclopedia, in short, should be a library in a few volumes, a cabinet containing a multitude of interesting subjects, just the ones about which the busy man is likely to desire to find some ready and reliable statement. As such it must touch the distinctive and characteristic features of every subject, handling these broadly and not seeking to penetrate their depths of minor detail. Such has been the thought kept constantly in view in the preparation of these volumes.

We have spoken of some of the distinctive features of this work. Now let us speak of the most distinctive, that which removes it from the ordinary category of such works and puts it in a class by itself. We refer to its *cumulative loose-leaf* method of adding new matter, a characteristic of such value and importance that we feel called upon to speak of it at some length in the preface. It is a notorious fact that encyclopedias, like men, have the unfortunate habit of growing old, but are not like men in keeping up with the world's movements. They are not a year on the market before they become incomplete. Something of wide interest and importance has happened that finds no place in their pages.

This is a weakness to which all the ordinary encyclopedias are subject. People die, but are still recorded in their pages as living; city and town populations change as new censuses are made, but the old figures stare out from the page; the world's history goes on, but its latest details are not to be found in the printed work; the platoon of discoverers make new explorations, such as the north and south poles, for instance, but the facts learned are still stated to be unknown, or not mentioned at all. The same thing is true of the arts, sciences and all the elements of human knowledge. New facts are learned, but the row of antiquated books to which you refer for a statement of these facts contains no mention of them. Yet, often enough the new facts are more important than the old. The new truth makes the old truth untrue. The work of reference to which you apply for information about the living present speaks to you only of the past. This is a defect to which all works of reference have hitherto been subject, and one which various methods have been devised to overcome. Hitherto all those methods have practically proved failures from their lack of simplicity, convenience, inexpensiveness, or some other essential factor.

WINSTON'S CUMULATIVE LOOSE-LEAF ENCYCLOPEDIA disposes of this difficulty in a simple and highly efficient manner and enables its owner to keep it constantly up-to-date with no inconvenience or trouble. By the use of this patented Invisible Binder and the Cumulative system, it is possible to insert new pages with an easy certainty and lack of effort and without injury to the form, binding or shape of the volumes. The system is so simple and perfect that a child can operate it.

ENCYCLOPEDIA MAKING REVOLUTIONIZED. The yearly Revision or Cumulative sheets, printed in page form, are furnished to purchasers of the work ready to put in their appropriate places. These sheets are prepared by the permanent Editorial Staff, maintained for the purpose of constantly revising and adding to the

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subject matter of the Encyclopedia, so that it shall always cover the latest developments in all fields of the world's activity and achievement, and keep the Encyclopedia up-to-date in every respect. Special attention is called to readers to this feature, which distinguishes this Encyclopedia from the old-fashioned Encyclopedia, for in its operation they can feel confident that the work in their hands will keep pace with the world's progress, and with no effort other than that of inserting the Revision sheets in their proper places. This distinguishing feature is dwelt upon as of interest and importance and one which renders WINSTON'S CUMULATIVE LOOSE-LEAF ENCYCLOPEDIA unique in character and without a rival in its distinguishing features of compactness and completeness.

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The accompanying diagram shows how easily the new pages, containing the new matter continually bringing the Encyclopedia up-to-date and which are furnished every year by the publishers, may be inserted in the volumes.

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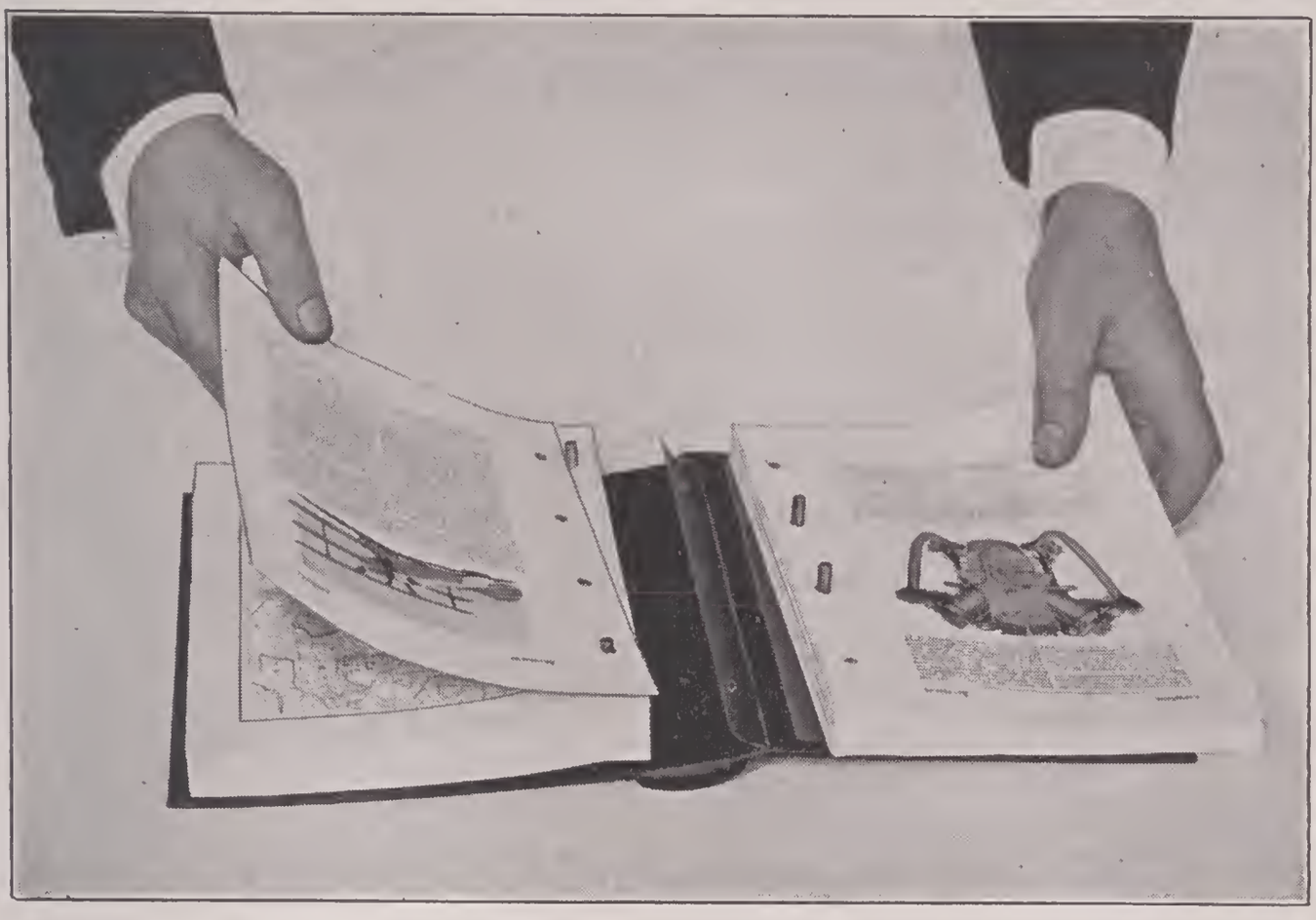
Lay the volume on table or desk. Open the front cover and you will see two small screw heads; unscrew both of these and take them out (don't be afraid of the pages scattering); next turn to the point at which you want to insert the new pages and lift the entire portion of the book to this point from the screw posts. The new pages are properly punched to fit the posts and may be dropped into place. The portion of the book lifted from the posts is then replaced and the screws put back.

Supplementary Pages Easily Inserted



The Simplicity of this Patented Invisible Loose-leaf volume makes it a matter of only a few seconds to insert the new pages, periodically furnished by the publishers. These pages are punched ready to put in their proper places at the end of each letter.

It will be seen that the pages cannot scatter, but are always held in alignment. There are no rings or springs to get out of order.

A rub of the thumb puts the screws in place instantly and the pages are locked tight. The simplicity of the mechanism of this Invisible Loose-leaf device guarantees its perfect action.

HOW TO INSERT REVISION PAGES

Begin with Volume I. Remove the screws as illustrated on reverse side of this page. Then lift out all the pages as far as the first thumb index, marked "Insert A." This will be at the end of the subjects under letter A. Here insert the revision pages dealing with subjects under this letter. Restore the preceding pages to position and replace the screws. Repeat the process with Volume II, putting the "B" insert pages at the end of the letter "B," and so on to Volume X.

As each year's revision sheets are received, insert them *after* the previous year's revisions. Thus at the end of each letter you have the story of the year so far as it concerns any subject under that letter. Successive years' revisions should be added in consecutive order according to the year indicated on each page. The Encyclopedia is strictly up to date when delivered to you and will be revised and kept up to date thereafter. For later information than that found in the original pages of the Encyclopedia, turn to the thumb index at the end of each letter and consult the revision sheets which you have added from year to year.

A RECORD OF THE WORLD'S PROGRESS

Bear in mind that these insert pages are not substitute pages but additional pages. The matter in them is ALL NEW MATTER, and it is possible by this system not only to give extended articles but also to include a greater number of minor revisions than would be possible if substitute pages were supplied. The chronicle of the year is set forth in these revision sheets, and you will find it of peculiar interest to read carefully the new articles as you insert the pages, and thus refresh your mind on the important events in the world's progress of the previous twelve months.

KEY TO PRONUNCIATION

Three methods are used to indicate the pronunciation of the words forming the headings of the separate articles:

(1) By dividing the word into syllables, and indicating the syllable or syllables to be accented. This method is followed where the pronunciation is entirely obvious. Where accent marks are omitted, the omission indicates that all syllables are given substantially the same value.

(2) Where the pronunciation differs from the spelling, the word is re-spelled phonetically, in addition to the accentuation.

(3) Where the sound values of the vowels are not sufficiently indicated merely by an attempt at phonetic spelling, the following system of diacritical marks is additionally employed to approximate the proper sounds as closely as may be done:

ā, as in f*a*te, or in b*a*re.
ä, as in *a*lms, Fr. â*m*e, Ger. B*a*hn=â of Indian names.
ȧ, the same sound short or medium, as in Fr. b*a*l, Ger. M*a*nn.
a, as in f*a*t.
ą, as in f*a*ll.
a, obscure, as in rur*a*l, similar to *u* in b*u*t, ė in h*e*r: common in Indian names.
ē, as in m*e*=*i* in mach*i*ne.
e, as in m*e*t.
ė, as in h*e*r.
ī, as in p*i*ne, or as *ei* in Ger. M*ei*n.
i, as in p*i*n, also used for the short sound corresponding to ē, as in French and Italian words.
eu, a long sound as in Fr. je*û*ne, = Ger. long *ö*, as in S*ö*hne, G*ö*the (Goethe).
eu, corresponding sound short or medium, as in Fr. p*eu*=Ger. *ö* short.
ō, as in n*o*te, m*oa*n.
o, as in n*o*t, fr*o*g—that is, short or medium.
ö, as in m*o*ve, t*wo*.
ū, as in t*u*be.
u, as in t*u*b: similar to ė and also to *a*.
u̧, as in b*u*ll.
ü, as in Sc ab*u*ne=Fr. *û* as *i*n d*û*, Ger. *ü* long as in gr*ü*n, B*ü*hne.
u̇, the corresponding short or medium sound, as in Fr. b*u*t, Ger. M*ü*ller.
oi, as in *oi*l.
ou, as in p*ou*nd; or as *au* in Ger. H*au*s.

The consonants, b, d, f, h, j, k, l, m, n, ng, p, sh, t, v, and z, when printed in Roman type, are always given their common English values in the transliteration of foreign words. The letter c is indicated by s or k, as the case may be. For the remaining consonant sounds the following symbols are employed:

ch is always as in ri*ch*.
d, nearly as *th* in *th*is = Sp. *d* in Madri*d*, etc.
g is always hard, as in *g*o.
h represents the guttural in Scotch lo*ch*, Ger. na*ch*, also other similar gutturals.
n̨, Fr. nasal *n* as in bo*n*.
r represents both English *r*, and *r* in foreign words, in which it is generally much more strongly trilled.
s, always as in *s*o.
th, as *th* in *th*in.
th, as *th* in *th*is.
w always consonantal, as in *w*e.
x = ks, which are used instead.
y always consonantal, as in *y*ea (Fr. *ligne* would be re-written lēny).
zh, as *s* in pleasure = Fr. *j*.

WINSTON'S CUMULATIVE LOOSE-LEAF ENCYCLOPEDIA

VOLUME I

A

A, the first letter in the English alphabet, and in most alphabets derived from the Phœnician. Most modern languages, as French, Italian, German, have only one sound for *a*, namely, the sound which is heard in *father* pronounced short or long; in English this letter is made to represent seven sounds, as in the words *father, mat, mate, mare, many, ball, what,* besides being used in such digraphs as *ea* in *heat, oa,* in *boat.* (See *Music*).

A1, a symbol attached to vessels of the highest class in Lloyd's register of shipping, A referring to the hull of the vessel, while 1 intimates the sufficiency of the rigging and whole equipment. Iron vessels are classed A1 with a numeral prefixed denoting that they are built according to certain specifications.

Aa (ä; from old German *aha;* allied to Latin *aqua,* water), the name of a great many streams of central and northern Europe.

Aachen (ä'*h*ën). See *Aix-la-Chapelle.*

Aal (äl), red dye obtained from the root of *Morinda citrifolia* (allied to Madder), used largely for dyeing cotton cloth in India. The center of the industry is at Gujarat.

Aalborg (äl'bor*h*; 'eel-town') a seaport of Denmark. Pop. 35,000.

Aalen (äl'en), town in E. Würtemberg, Germany, on the Kocher, with iron works, woolen mills and metalware manufactures. Pop. 12,000.

Aalesund (äl'sound; 'eel sound'), a fishing port of Norway, with an extensive trade. Pop. 13,836.

Aali Pasha (ā'lē pa-shä'), Turkish diplomatist, was born in 1815; died in 1871. He served five terms as grand vizier, or prime minister, and was prominent as minister of foreign affairs and as an advocate of reform.

Aar (är), the name of several European rivers, of which the chief (160 miles long) is a tributary of the Rhine, next to it and the Rhone the longest river in Switzerland. It has its origin from the upper and lower glaciers of the Aar in the Bernese Alps. On it are Interlaken, Thun, Bern, Solothurn and Aarau, to which, as to the canton of Aargau, it gives its name.

Aarau (ä'rou), a well-built and finely situated town in Switzerland, capital of Canton Aargau, on the river Aar. Pop. 9,536.

Aardvark (ärd'värk; earth-pig), a burrowing insectivorous animal of South Africa, *Orycterŏpus capensis,* order Edentata, having affinities with the ant-eaters and armadillos. Called also *ground-hog* and *Cape pig.*

Aardwolf (ärd'wulf; earth-wolf; *Protĕles cristātus*), a carnivorous burrowing animal of South Africa, allied to the hyenas and civets. Feeds on carrion, small mammals, insects, etc.

Aarestrup (är'es-trup), CARL LUDWIG EMIL, (1800-56), Danish poet, born in Copenhagen, one of the greatest lyrists of Denmark. His *Efterladte Digte* (1863) created a sensation by their erotic tone. His *Samlede Digte* were edited by Georg Brandes.

Aargau (är'gou), or ARGOVIE (år'govē), a northern canton of Switzerland; area, 543 square miles; hilly, well wooded, abundantly watered by the Aar and its tributaries, and well cultivated. It formed part of the canton Bern till 1798. Pop. 240,000, of whom more than half are Protestants. German is commonly spoken. Capital, Aarau.

Aarhuus (ar'hös), a seaport and ancient town of Denmark, on the east coast of Jutland; has a fine Gothic cathedral, a good harbor, considerable trade and manufactures of woolens, gloves, hats, tobacco, etc. Pop. 70,000.

Aaron (ā'ron), of the tribe of Levi, eldest son of Amram and Jochebed, and brother and assistant of

Moses. At Sinai, when the people became impatient at the long-continued absence of Moses, he complied with their request in making a golden calf, and thus became involved with them in the guilt of gross idolatry. The office of high-priest, which he first filled, was made hereditary in his family. He died at Mount Hor at the age of 123, and was succeeded by his son Eleazar.

Aaron's Beard. See *Saint John's Wort* and *Toad-flax.*

Aaron's Rod. See *Golden-rod* and *Mullein.*

Aasen (ä'sen), Ivar Andreas, Norwegian author and philologer, born in 1813; died in 1896; was of peasant origin and self-educated. His chief work was that of reconstructing an eclectic national language out of existing Norwegian dialects. In 1848 his *Norske Folkesprogs Grammatik* appeared, followed in 1850 by his *Ordbog over det Norske Folkesprog.* Later publications, dealing particularly with his labors in reforming the language, were a grammar, *Norsk Grammatik,* 1864, and a dictionary, *Norsk Ordbog,* 1873, supplemented by the *Norsk Ordbog,* 1890-92, of Hans Ross.

Aasvar (ōs'vär), a group of small islands off the Norwegian coast, under the Arctic Circle, where there is an important December herring-fishery.

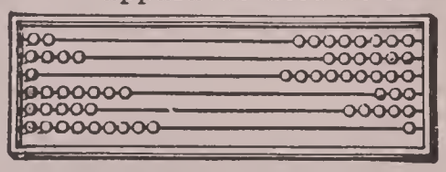
Ab, the eleventh month of the Jewish civil, the fifth of the ecclesiastical, year—part of July and part of August.

Ababdeh (ab-ab'de), a nomadic African race inhabiting Upper Egypt and part of Nubia, between the Nile and the Red Sea, of Hamitic stock, and thus akin in race to the ancient Egyptians; dark brown in color; Mohammedans in religion.

Abaca (ab'a-ka), or Manila Hemp, a strong fibre yielded by the leaf-stalks of a kind of plantain (*Musa textilis*), which grows in the Indian Archipelago, and is cultivated in the Philippines. The outer fibres of the leaf-stalks are made into strong and durable ropes, the inner into various fine fabrics.

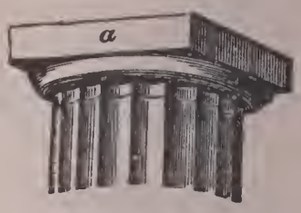
Abaco, Great and Little, two islands of the Bahamas group.

Abacus, a Latin term applied to an apparatus used in elementary



Abacus for Calculations,

schools for facilitating arithmetical operations, consisting of a number of parallel cords or wires, upon which balls or beads are strung, the uppermost wire being appropriated to units, the next to tens, etc. In classic architecture it denotes the tablet forming the upper member of a column, and supporting the entablature. In Gothic architecture the upper member of a column from which the arch springs.



Doric Capital—*a*, the Abacus.

Abaddon (a-bad'un; Heb. destruction), the name given in Rev., ix, 11, as that of the angel of the bottomless pit, otherwise called *Apollyon.*

Abalone (ab-a-lō'ne), a name in California for a species of ear-shell (Haliotis) that furnishes mother-of-pearl.

Abana, a river near Damascus.

Abancay (ä-ban-ki'), the chief city in Apurimac department, a silver mining district of Peru, about 40 miles southwest of Cuzco. Sugar refining is the principal industry. Pop. 5000.

Abandonment (a-ban'don-ment), a term of marine insurance, employed to designate the case where the party insured gives up his whole interest in the property to the insurer, and claims as for a total loss.

Abano (å'bå-nō), a village of North Italy, 5 miles from Padua, famous for its mud-baths and warm springs. It claims to be the birthplace of Livy. Pop. (commune) about 4,000.

Ab'ano, d', Pietro, a celebrated Italian physician, philosopher, and astrologer, born at Abano in 1250, died at Padua in 1316. He studied at Padua, went to Constantinople to learn Greek, visited Paris and studied mathematics and medicine, and traveled in England and Scotland. He became professor of medicine at Padua, and wrote on this subject and on philosophy.

Abarim (å-bå'rim), mountain range of Eastern Palestine, including Nebo, whence Moses is said to have viewed the Promised Land.

Abatement (a-bāt'ment), in law, has various uses. *Abatement of nuisances* is the remedy allowed to a person injured by a public or private nuisance, of destroying or removing it himself. A *plea in abatement* is brought forward by a defendant when he wishes to defeat or quash a particular action on some formal or technical ground. Abate-

ment, in mercantile law, is an allowance, deduction, or discount made for prompt payment or other reason.

Abattis (ab'a-tis), ABATIS, in military affairs, a mass of trees cut down and laid with their branches turned towards the enemy in such a way as to form a defence for troops stationed behind them.

Abattoir (ab-at-wär'), a French term for a slaughter-house, now anglicized. The abattoirs of Paris were instituted by Napoleon in 1807, and brought to completion in 1818. Such public slaughter-houses, provided with every sort of convenience, kept admirably clean, and with a plentiful supply of water, are now to be found in many large towns. They exist in all the large cities of the United States, and on a very large scale in the great meat-packing cities of the West, notably in Chicago.

Abauzit, FIRMIN (á-bō-zē), a French Protestant scholar, born in 1679, died 1767. He lived chiefly at Geneva, but visited England and was highly esteemed by Newton, who considered him not unfit to be judge between himself and Leibnitz in the quarrel as to the invention of the integral and differential calculus. He left few writings.

Abbadie, D' (åb-å-dē), ANTOINE THOMSON and ARNAUD MICHEL, French travelers, born in Dublin in 1810 and 1815, respectively. They spent a number of years in Abyssinia, and published works throwing much light on that country; by Arnaud, *Douze ans dans la Haute-Ethiopie;* by Antoine, *Géodésie d'Ethiopie,* etc. The elder died in 1897, the younger in 1893.

Abbas I (äb'bäs), the *Great,* Shah or King of Persia, born in 1557, obtained the throne in 1586, and died in 1628. He obtained several victories over the Turks and Usbek Tartars, and extended his rule until his dominions stretched from the Tigris to the Indus. He is looked upon by the Persians as their greatest sovereign.

Abbas Mirza, a Persian prince and soldier, son of the shah Feth Ali, born 1783, died 1833. He reorganized his army on the European system and distinguished himself in the wars against Russia.

Abbassides (ab'as-sīdz), the name of an Arabian dynasty which supplanted the Ommiades. It traced its descent from Abbas (born 566, died 652), uncle of Mohammed, and furnished thirty-seven caliphs to Bagdad between 749 and 1258. Harun al Rashid was a member of this dynasty. See *Caliphs.*

Abbate (åb-bä'tā), the Italian term corresponding to *Abbé.*

Abbe, CLEVELAND, meteorologist, born in New York 1838; graduated at College of City of New York in 1857; studied astronomy and meteorology, and as director of Cincinnati Observatory (1868–73) inaugurated the system of daily weather reports. This led the United States to take up similar work, under his supervision. He was meteorologist of the U. S. Signal Service 1871–91; after 1891 meteorologist of the Weather Bureau; also professor of meteorology of Columbian (now George Washington) University. Died, 1916.

Abbé (äb-ā), the French word for abbot, was, before the French revolution, the common title of all who had studied theology either with a view to become ordained clergymen or merely in the hope of obtaining some appointment or benefice, to which such study was considered a preliminary requisite. They were marked out by their short, violet-colored robe, and formed an influential class in society, though often with little of the clerical in manners or character. They acted at times as chaplains or tutors in noble families or engaged in literary work or as college professors.

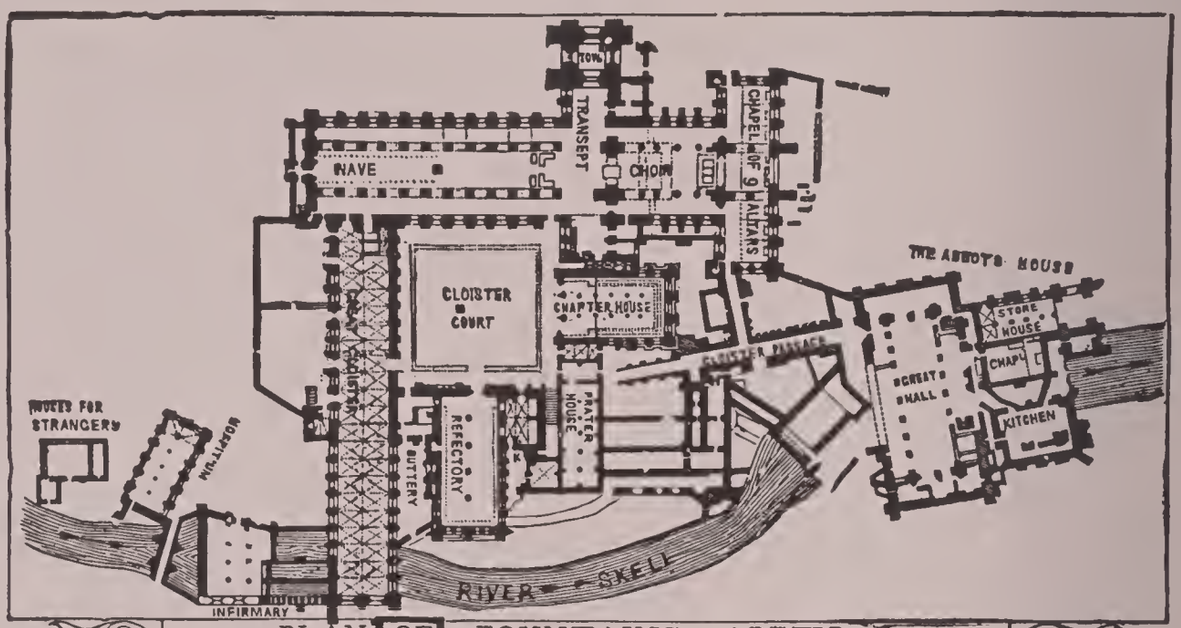
Abbeokuta (ä-be-o-koo'tä), capital of the province of Egba, in Yoruba, 80 miles N. of Lagos. It is a town of West Africa composed of scattered and filthy lines of houses built of mud, and surrounded by a mud wall 17 or 18 miles in circuit. Pop. 150,000.

Ab'bess. See *Abbey* and *Abbot.*

Abbeville (åb-vēl'), a town of France, dep. Somme, on the river Somme (which is here tidal), 25 miles N. W. of Amiens. It has a Gothic church (St. Wolfram) with magnificent west front in the Flamboyant style; manufactures of woolens, carpets, sugar, etc., and considerable trade. Pop. 22,000.

Abbey (ab'ē), a monastery or religious community of the highest class, governed by an *abbot,* assisted generally by a prior, a subprior, and other subordinate functionaries; or, in the case of a female community, superintended by an *abbess.* An abbey invariably included a church. A priory differed from an abbey only in being scarcely so extensive an establishment, and was governed by a *prior.* In the English conventual cathedral establishments, as Canterbury, Norwich, Ely, etc., the archbishops or bishops held the abbot's place, the immediate governor of the monastery being called a prior. Some priories sprang originally from the more important abbeys, and re-

mained under the jurisdiction of the abbots; but subsequently any real distinction between abbeys and priories was lost. The greater abbeys formed most complete and extensive establishments, including not only the church and other buildings devoted to the monastic life and its daily requirements, such as the refectory or eating-room, the dormitories or sleeping-rooms, the room for social intercourse, the school for novices, the scribes' cells, library, and so on; but also workshops, storehouses, mills, cattle and poultry sheds, dwellings for artisans, laborers, and other servants, infirmary, guest-house, etc. Among the most famous abbeys on the continent of Europe were those of Cluny, Clairvaux, and Citeaux in France; St. Gall in Switzerland, and



PLAN OF FOUNTAINS ABBEY.

Fulda in Germany; the most noteworthy English abbeys were those of Westminster, St. Mary's of York, Fountains, Kirkstall, Tintern, Rievaulx, Netley; and of Scotland, Melrose, Paisley, and Arbroath. See *Abbot*, *Monastery*.

Ab'bey, Edwin Austin, artist; born Philadelphia, 1852; educated at Phila. Academy of the Fine Arts. Exhibited his first picture, *A May Day Morning*, at the Royal Academy in 1890; was commissioned by King Edward VII to paint the scene of his coronation in 1901. Has painted many notable pictures, including *Crusaders Sighting Jerusalem*, *The Quest of the Holy Grail*, etc., also two published illustrated editions of *Herrick's Poems*, *She Stoops to Conquer*, *Comedies of Shakespere*, etc. Died 1911.

Abbiategrasso (åb-bē-ä'tā-grås-sō), a town in the north of Italy, 14 miles W. S. W. of Milan. Pop. about 14,000.

Abbot (ab'ut), (ultimately from Syriac *abba*, father), the head of an abbey (see *Abbey*), the lady of similar rank being called *abbess*. An abbess, however, was not, like the abbot, allowed to exercise the spiritual functions of the priesthood, such as preaching, confessing, etc.; nor did abbesses ever succeed in freeing themselves from the control of their diocesan bishop. In the early age of monastic institutions (say 300–600 A. D.) the monks were not priests, but simply laymen who retired from the world to live in common, and the abbot was also a layman. In the course of time the abbots were usually ordained, and when an abbey was directly attached to a cathedral the bishop was also abbot. At first the abbeys were more remarkable for their numbers than for their magnitude, but latterly many of them were large and richly endowed, and the heads of such establishments became personages of no small influence and power, more especially after the abbots succeeded (by the eleventh century) in freeing themselves from the jurisdiction of the bishop of their diocese. Hence families of the highest rank might be seen eagerly striving to obtain the titles of abbot and abbess for their members. The great object was to obtain control over the revenues of the abbeys, and for this purpose recourse was had to the device of holding them under a kind of trust, or, as it was called, *in commendam*. According to the original idea the abbot *in commendam*, or 'commendator,' was merely a temporary trustee, who drew the whole or part of the revenues during a vacancy, and was bound to apply them to specific purposes; but ultimately the

commendator or lay abbot in many instances held the appointment for life, and was allowed to apply the whole or a large portion of the revenues to his own private use. Many of the abbots latterly vied with the bishops and nobility in rank and dignity, wearing a miter and keeping up a great style. In England twenty-eight abbots long sat in the House of Lords. The Reformation introduced vast changes, not only in Protestant countries, where abbeys and all other monastic establishments were generally suppressed, but even in countries which still continued Roman Catholic; many sovereigns, while displaying their zeal for the R. Catholic Church by persecuting its opponents, not scrupling to imitate them in the confiscation of church property. The title *abba* is given to the bishops of the Copts and Syrians, and *abuna* ('our father') to the head of the Abyssinian Church.

Abbot, GEORGE (1562-1633), Archbishop of Canterbury from 1611. He retained the friendship of James I to the last, but after the accession of Charles I his influence at court was superseded by that of Laud. He was extremely narrow in his thought.

Abbotsford, the country seat of Sir Walter Scott (q. v.), on the south bank of the Tweed, 3 miles from Melrose Abbey.

Abbott, CHARLES CONRAD (1843-1919), an American naturalist, born at Trenton, N. J. His chief work consisted in collecting human relics. His books include *Primitive Industry, In Nature's Realm,* etc.

Abbott, EMMA 1849-91), an American operatic soprano, born in Chicago, Ill. After singing in Plymouth Church, Brooklyn, she studied in Europe and returning to America won instant success in the popular operas.

Abbott, LYMAN (1835-1922), an American Congregational clergyman, author and editor, born at Roxbury, Mass. He succeeded Henry Ward Beecher (q. v.) in Plymouth Church, Brooklyn, 1889-99, subsequently devoting himself to editorial work on the *Outlook* and the writing of a number of books, including *Jesus of Nazareth, The Rights of Man. The Spirit of Democracy, Letters to Unknown Friends,* etc.

Abbott, SIR JOHN JOSEPH CALDWELL (1821-93), a Canadian lawyer and statesman, born at St. Andrew's, Quebec. He was premier of the Dominion, 1891-92, succeeding Sir John A. Macdonald (q. v.).

Abbreviations (a-brē'vi-ā'shuns), devices used in writing and printing to save time and space, consist usually of curtailments effected in words and syllables by the removal of some letters, often of the whole of the letters except the first. The following is a list of the more important:—

@, *ad,* at.
A. B., *artium baccalaureus,* bachelor of arts.
A. C., *ante Christum,* before Christ.
Acc., A/c. or Acct., account.
A. D., *anno Domini,* in the year of our Lord; used also as if equivalent to, 'after Christ,' or 'of the Christian era.'
A. D. C., aide-de-camp.
Ad inf., *ad infinitum,* to infinity.
Ad lib., *ad libitum,* at pleasure.
Æt. or Ætat., *ætatis* (*anno*), in the year of his age.
A. H., *anno Hejiræ,* in the year of the Hegira.
Ala., Alabama.
A. M., *anno mundi,* in the year of the world; *ante meridiem,* forenoon; *artium magister,* master of arts.
Anon., anonymous.
A. R. A., associate of Royal Academy
Ariz., Arizona.
Ark., Arkansas.
Atty.-Gen., attorney-general.
A. U. C., *ab urbe condita,* from the building of Rome (753 B. C.)
A. V., authorized version.
B. A., bachelor of arts.
Bart. or Bt., baronet.
bbl., barrel.
B. C., before Christ.
B. C. L., bachelor of civil law.
B. D., bachelor of divinity.
B/L, bill of lading.
B. L., bachelor of laws.
B. M., bachelor of medicine.
B. Mus., bachelor of music.
B. S., bachelor of surgery.
B. Sc., or B. S., bachelor of science.
B. V. M., Blessed Virgin Mary.
C., cap., or chap., chapter.
C., *centum,* hundred, also centigrade.
Cal., California.
Can., Canada.
Cantab., of Cambridge.
Capt., captain.
c. c., Cc., cubic centimetre.
C. E., civil engineer.
Cf., *confer,* compare.
C. J., chief justice.
C. M., *chirurgiæ magister,* master in surgery; common metre.
c. m., centimetre.
Co., company or county.
C. O. D., cash on delivery.
Col., colonel.
Colo., Colorado.
Com., commander, committee.
C. S., Christian Science.

Conn., Connecticut.
Cr., credit, creditor.
Crim. con., criminal conversation.
C. S., civil service.
Curt., current, the present month.
Cwt., hundredweight.
d., *denarius*, penny or pence.
D. C., District of Columbia; *da capo*, from the beginning.
D. C. L., doctor of civil law.
D. D., doctor of divinity.
D. D. S., doctor of dental surgery.
Del., Delaware.
Dep., deputy.
Dept., Department.
D. F., defender of the faith.
D. G., *Dei gratia*, by the grace of God.
Dict., dictionary.
D. Lit., doctor of literature.
do., *ditto*., the same
D. O., doctor of osteopathy.
D. O. M., *Deo Optimo Maximo*, to God, the Best and the Greatest.
Dr., doctor, also debtor.
D. Sc., doctor of science.
D. V., *Deo volente*, God willing.
E., east.
Ed., edition; editor.
E. E., errors excepted, electrical engineer.
e. g., *exempli gratia*, for example.
E. I., East Indies.
Eng., England.
Esq., esquire.
et al., et alii, and others.
et seq., and the following.
etc. or &c., *et cætera*, and the rest, and so on.
Exr., executor.
F., franc, florin, farthing, foot.
F. or Fahr., Fahrenheit's thermometer.
F. A. S., fellow of the Antiquarian Society.
F. D., *fidei defensor*, defender of the faith.
Fec., *fecit*, he made or did it.
F. F. V., first families of Virginia.
F. G. S., fellow of the Geological Society.
Fla., Florida.
F. M., field-marshal.
F. O. B., free on board (goods delivered).
F. R. A. S., fellow of the Royal Astronomical (or Asiatic) Society.
F. R. G. S., fellow of the Royal Geographical Society.
F. R. S., fellow of the Royal Society.
F. R. S. E., fellow of the Royal Society of Edinburgh.
Fr., France.
ft., foot or feet.
g., gr., gramme.
G. B., Great Britain.
Gen., General, Genesis.
Ga., Georgia.
Ger., Germany.
G. O. P., Grand Old Party (the U. S. Republican party).
Gov., governor.
Hhd., hogshead.
H. M. S., his or her majesty's ship or service.
hoc est, this is.
Hon., honorable.
Ia., Iowa.
Ib. or Ibid., *Ibidem*, in the same place.
Id., *idem*, the same.
Ida., Idaho.
i. e., *id est*, that is.
+ I. H. S., *Jesus hominum salvator*, Jesus, Saviour of men. The letters, at first an abbreviation of the Greek for *Jesus*, came to stand for three words.
Ill., Illinois.
incog., *incognito*, unknown.
Ind., Indiana.
inf., *infra*, below.
inst., instant, or of this month; institute.
I. O. O. F., Independent Order of Odd Fellows.
I. O. U., I owe you.
i. q., *idem quod*, the same as.
J. D., *juris doctor*, doctor of law.
J. P., justice of the peace.
Jr., junior.
J. U. D., *juris utriusque doctor*, doctor both of the civil and the canon law.
Kans., Kansas.
K. C., king's counsel.
K. C. B., Knight Commander of the Bath.
kg. or kilog., kilogramme.
K. G. F., knight of the Golden Fleece.
kilo., kil., kilometre.
Kt., or Knt., knight.
Ky., Kentucky.
L., l., or £, pounds sterling.
La., Louisiana.
Lat., Latin, latitude.
Lb. or lb. *libra*, a pound (weight).
l. c., *loco citato*, in the place cited.
Lib. (*liber*), a book.
Lieut., lieutenant.
Litt. D., doctor of literature.
LL. B., *legum baccalaureus*, bachelor of laws.
LL. D., *legum doctor*, doctor of laws (that is the civil and the canon law).
LL. M., master of laws.
Lon. or Long., longitude.
L. S., *locus sigilli*, the place of the seal.
L. S. D., *libræ, solidi, denarii*, pounds, shillings, pence.
M., monsieur.
M. A., master of arts.
Maj., major.
Maj.-gen., major-general.
Mass., Massachusetts.
Math., mathematics.
M. B., bachelor of medicine.
M. C., member of Congress.

M. D., *medicinæ doctor*, doctor of medicine.
Md., Maryland.
Me., Maine.
M. E., mining engineer; Methodist Episcopal.
M. F. H., master of fox hounds.
Mem., memorandum.
Messrs., *messieurs*, gentlemen.
Mich., Michigan.
Minn., Minnesota.
Miss., Mississippi.
Mlle., mademoiselle.
mm., millimetre.
Mme., madame.
Mo., Missouri.
Mont., Montana.
M. P., member of Parliament.
MS., manuscript; MSS., manuscripts.
M. S., master of science.
Mus. D., *musicæ doctor*, doctor of music.
N., north; name.
N. A., North America.
N. B., *nota bene*, take notice; also New Brunswick.
N. C., North Carolina.
N. Dak., North Dakota.
N. E., northeast.
Nebr., Nebraska.
Nem. con., *nemine contradicente*, no one contradicting, unanimously.
Nev., Nevada.
N. H., New Hampshire.
N. J., New Jersey.
N. Mex., New Mexico.
No., *numero*, number.
N. P., notary public.
N. S., new style, Nova Scotia.
N. S. W., New South Wales.
N. T., New Testament.
N. W., northwest.
N. Y., New York.
N. Z., New Zealand.
O., Ohio.
Ob., *obiit*, died.
O. K., all correct.
Okla., Oklahoma.
Ore., Oregon.
O. S., old style.
O. T., Old Testament.
Oxon., *Oxoniensis*, of Oxford.
oz., ounce or ounces.
Pa., Penn., Penna., Pennsylvania.
P. C., privy-councilor.
P. E., Protestant Episcopal.
Ped. D., doctor of pedagogy.
per cent., *per centum*, by the hundred.
Ph. B., bachelor of philosophy.
Ph. D., *philosophiæ doctor*, doctor of philosophy.
P. M., *post meridiem*, afternoon.
P. O., postoffice.
P. P., parish priest; past participle.
P. pr., present participle.
P. P. C., *pour prendre congé*, to take leave.
Prep., preposition.
Pres., president.
Prof., professor.
Pron., pronoun.
Pro tem., *pro tempore*, for the time being.
prox., *proximo* (*mense*), next month.
P. S., postscript.
P. T. O., please turn over.
Q., question; queen.
q. e., *quod est*, which is.
Q. E. D., *quod erat demonstrandum*, which was to be demonstrated.
Q. M. G., quartermaster-general.
Quant. suff., q. s., *quantum sufficit*, as much as is needful.
q. v., *quod vide*, which see.
R., *rex*, *regina*, king, queen.
R. A., royal academician.
R. C., Roman Catholic.
R. E., royal engineers, right excellent.
Rev., reverend.
R. I., Rhode Island.
R. I. P., *requiescat in pace*, may he rest in peace.
R. R., railroad.
R. S. V. P., *répondez, s'il vous plait*, reply, if you please.
Rt. Hon., right honorable.
Rt. Rev., right reverend.
R. V., revised version.
S., south.
S. or St., saint.
S. C., South Carolina; Supreme Court.
Sc. or Scil., *scilicet*, namely, viz.
S. Dak., South Dakota.
S. E., southeast.
Sec., secretary; section; second.
Seq., *sequens*, the following.
S. J., Society of Jesus (Jesuits).
S. P. Q. R., *senatus populusque Romanus*, the senate and people of Rome.
sq. ft., square feet.
sq. in., square inches.
sq. m., square miles.
Sr., senior.
St., saint, street.
Ste., sainte.
S. v., *sub voce*, under the word or heading.
S. W., southwest.
Tenn., Tennessee.
Tex., Texas.
T. N. T., trinitrotoluene.
U., Utah.
ult., *ultimo*, last (month).
U. of S. A., Union of South Africa.
U. S., United States.
U. S. A., United States of America United States army.
U. S. N., United States navy.
V., *vide*, see; also *versus*, against.
v., volt or volts.

Va., Virginia.
V. C., Victoria Cross.
V. D. M., *verbi dei minister*, minister of the word of God.
Vice-Pres., vice-president.
Viz., *videlicet*, to wit, or namely.
V. S., veterinary surgeon.
vs., *versus*, against.
Vt., Vermont.
W., west.
Wash., Washington.
W. I., West Indies.
Xmas, Christmas.
Wis., Wisconsin.
W. Va., West Virginia.
Wyo., Wyoming.
&, and.
&c., and so forth.

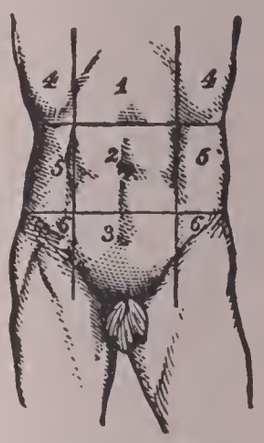
In LL. D., LL. B., etc., the letter is doubled, according to the Roman system, to show that the abbreviation represents a plural noun.

Abd-el-Kader (äbd-el-kä'der), an Arab chief born in Algeria, 1807; died at Damascus, 1883. He was the chief opponent of the French in their conquest of Algeria, but at last surrendered to them in 1847, and was imprisoned till set at liberty by Napoleon III, in 1852. Afterwards he resided chiefly at Damascus, but made various journeys, and visited the Paris exhibition of 1867. He wrote a religious work in Arabic.

Abdera (ab-dē'ra), an ancient Greek city on the Thracian coast, the birthplace of Democritus (the laughing philosopher), Anaxarchus, and Protagoras. Its inhabitants were proverbial for stupidity.

Abdication (ab-di-ka'shun), properly the voluntary, but sometimes also the involuntary, resignation of an office or dignity, and more especially that of sovereign power. Abdication does not necessarily require the execution of a formal deed, but may be presumed from facts and circumstances, as in the case of the English Revolution in 1688, when, after long debate, it was resolved by both houses of parliament that King James II, having endeavored to subvert the constitution of the kingdom, had '*abdicated* the government, and that the throne is thereby vacant.' Yet the sovereign of Great Britain cannot constitutionally abdicate without the consent of both houses of parliament.

Abdomen (ab-do'men), in man, the belly, or lower cavity of the trunk, separated from the upper cavity or thorax by the diaphragm or midriff, and bounded below by the bones of the pelvis. It contains the viscera belonging to the digestive and urinary systems. What are called the *abdominal regions* will be understood from the accompanying cut, in which 1 is the *epigastric* region, 2 the *umbilical*, 3 the *pubic*, 4 4 the right and left *hypochondriac*, 5 5 the right and left *lumbar*, 6 6 right and left *iliac*. The name is given to the corresponding portion of the body in other animals. In insects it comprises the whole body behind the thorax, usually consisting of a series of rings.



Abdominal Regions.

Abdominal Fishes (Abdominales), a group of the soft-finned (or malacopterous) fishes having fins upon the abdomen, and comprising the herring, pike, salmon, carp, etc.

Abduction (ab-duk'shun), a legal term, generally applied to denote the offense of carrying off a female, either forcibly or by fraudulent representations. Such a delinquency in regard to a man is styled *kidnapping*.

Abdul-Aziz (ab'döl-az'ēz), Sultan of Turkey, brother to Abdul-Mejid, whom he succeeded in June, 1861. He concluded treaties of commerce with France and England, both of which countries he visited in 1867. Deposed in May, 1876, he committed suicide, or more probably was assassinated, in June, the same year. He was succeeded by his nephew, Murad V.

Abdul Baha (äbd'ool bä-hä'), a religious leader, head of the Bahaist movement, born in Persia. For forty years Abdul Baha was imprisoned, and it was not until after the Young Turks came into possession of the government, that he was free to travel. He visited the United States in 1912, talking to Bahaists in many cities.

Adbul-Hamid II (ab'döl-ha'mid), Sultan of Turkey, younger son of Abdul-Mejid, born in 1842, succeeded his brother Murad V. At that time Turkey, which was at war with Servia, was forced to an armistice by Russia. The persecution of the Christian population of Bulgaria led, in April, 1877, to a declaration of war by Russia. During the struggle which ensued the Turks fought with great bravery, but they had ultimately to sue for peace. A treaty was signed at San Stefano, in February, 1878, but its provisions were modified by a congress of the great powers. (See *Berlin, Treaty of.*) In 1908 Abdul

was obliged by the demands of reformers to restore the constitution which he had abrogated in 1876. An effort on his part to regain his autocratic power led to a military outbreak in 1909, ending in his deposition in favor of his brother Mohammed. Died Feb. 10, 1918.

Abdul-Latif (äb'dŏl-la-tef') an Arab writer and physician, born at Bagdad in 1161, died there in 1231. He was patronized by the celebrated Saladin, and published an excellent description of Egypt, which is still extant.

Abdul-Mejid (ab'dŏl-me-jed'), Sultan of Turkey, born in 1822 or 1823, succeeded his father, Mahmud II, July 1, 1839. At the time of his accession Mehemet, Pasha of Egypt, had a second time risen against the Turkish yoke; his son Ibrahim had inflicted a severe defeat on the Turks at Nizib (24th June, 1839), and was advancing on Constantinople. But the intervention of the leading European powers checked the designs of Mehemet Ali, and saved the Turkish empire. Abdul-Mejid was desirous of carrying out reforms, but most of them remained inoperative, or caused bloody insurrections where attempts were made to carry them out. Owing to disputes between the Latin and Greek Churches regarding the rights of precedence and possession at the 'holy places' in Palestine, and to demands made by the czar virtually implying the right of protectorate over the Christian subjects of the sultan, war broke out between Turkey and Russia in 1853. In the following year the Porte effected an alliance with France and England (hence the Crimean War), and later on with Sardinia. (See *Crimean War.*) Abdul-Mejid died in 1861, and was succeeded by his brother, Abdul-Aziz.

Abdur-Rahman III (äbd-er-räh'-man), surnamed An Nasir, eighth Sultan and first Caliph of Cordova, began to reign in 912. Brought the Mohammedan empire in Spain to its highest pinnacle of glory. Built a palace near Cordova of unequalled magnificence. Died in 961.

Abdur-Rahman, Ameer of Afghanistan, born about 1830, was chosen ameer in 1880 and proved an able ruler, friendly to the British, who paid him an annual subsidy. Died, 1901.

Abecedarian (ā-bē-sē-da'ri-an), a term formed from the first four letters of the alphabet, and applied to the followers of Storch, a German Anabaptist, in the sixteenth century, because they rejected all worldly knowledge, even the learning of the alphabet.

A Becket THOMAS. See *Becket.*

A Beckett, GILBERT ABBOTT, English writer, born near London in 1811. He studied for the bar, and became one of the original staff of Punch, was long a leader-writer of the Times and Morning Herald. He wrote *Comic History of England, Comic History of Rome,* and *Comic Blackstone,* and between fifty and sixty plays, some of which still keep the stage. In 1849 he was appointed a metropolitan police magistrate, an office he retained till his death in 1856. His son, ARTHUR WILLIAM, born in 1844, became a journalist and wrote a number of plays and novels. He was on the staff of Punch from 1874 to 1902.

Abel (ā'bel), properly *Hebel* (Heb. breath, vapor, transitoriness), the second son of Adam. He was a shepherd, and was slain by his brother Cain from jealousy because his sacrifice was accepted while Cain's was rejected. Several of the fathers, among others Sts. Chrysostom, and Augustine, regard him as a type of Christ.

Abelard (ab'e-lärd), or ABAILARD, PETER, a celebrated scholastic teacher, born near Nantes in Brittany, in 1079. He made extraordinary progress with his studies, and, ultimately eclipsing his teachers, he opened a school of scholastic philosophy near Paris, which attracted crowds of students from the neighboring city. His success in the fiery debates which were then the fashion in the schools made him many enemies, among whom was Guillaume de Champeaux, his former teacher, chief of the cathedral school of Nôtre Dame and the most advanced of the Realists. Abelard succeeded his adversary in this school (in 1113), and under him were trained many men who afterwards rose to eminence, among them being the future Pope Celestin II, Peter Lombard, and Arnold of Brescia. While he was at the height of his popularity, and in his fortieth year, he became infatuated with a passion for Héloïse—then only eighteen years of age—niece of Fulbert, a canon of Paris. Obtaining a home in Fulbert's house under the pretext of teaching Héloïse philosophy, their intercourse at length became apparent, and Abelard, who had retired to Brittany, was followed by Héloïse, who there gave birth to a son. A private marriage took place, and Héloïse returned to her uncle's house, but refusing to make public her marriage (as likely to spoil

Abelard's career), she was subjected to severe treatment at the hands of her uncle. To save her from this Abelard carried her off and placed her in a convent at Argenteuil, a proceeding which so incensed Fulbert that he hired ruffians who broke into Abelard's chamber and subjected him to a shameful mutilation. Abelard, filled with grief and shame, became a monk in the abbey of St. Denis, and Héloïse took the veil. When time had somewhat moderated his grief he resumed his lectures; but trouble after trouble overtook him. His theological writings were condemned by the Council of Soissons, and he retired to an oratory called the Paraclete, subsequently becoming head of the abbey of St. Gildas-de-Rhuys in Brittany. For a short time he again lectured at Paris (1136), but his doctrines again brought persecution on him, and St. Bernard had him condemned by the council of Sens and afterwards by the pope. Abelard did not long survive this, dying at St. Marcel, near Châlon-sur-Sâone, in 1142. Héloïse, who had become abbess of the Paraclete, had him buried there, where she herself was afterwards laid by his side. Their ashes were removed to Paris in 1800, and in 1817 they were finally deposited beneath a mausoleum in the cemetery of Père la Chaise. Abelard is credited with the invention of a new philosophical system, midway between Realism and Nominalism. A complete edition of his works was published by Cousin (2 vols., Paris, 1849–59), and the letters of Abelard and Héloïse have been often published in the original and in translations.

Abelite, ABELIAN (ā'bel-it, a-bel'i-an), a member of a religious sect in Africa which arose in the fourth century after Christ. They married, but lived in continence, after the manner, as they maintained, of Abel, and attempted to keep up the sect by adopting the children of others. Also one of a sect which flourished about 1745 in Greifswald, Germany.

Abenakis, see *Abnakis.*

Abencerrages (ab-en-ser'a-jez), a powerful and distinguished Moorish family of Granada, the chief members of which, thirty-six in number, are said to have been massacred in the Alhambra by the king Abu-Hassan (latter half of the fifteenth century) on account of the attachment of his sister to one of them—a legend which has furnished the subject of many poems both Arabic and Spanish, and formed the basis for Chateaubriand's *Aventures du dernier des Abencérages.*

Aben Ezra (ä'ben ez'ra), a celebrated Jewish rabbi, born at Toledo about 1092, traveled in pursuit of knowledge in England, France, Italy, and Greece, and is supposed to have died in Rhodes about 1174. He particularly distinguished himself as a commentator on Scripture.

Abensberg (ä'bens-ber*h*), a Bavarian manufacturing town with 2200 inhabitants; celebrated for Napoleon's victory over the Austrians, 20th April, 1809.

Abeoku'ta. See *Abbeokuta.*

Aber (ab'er), a prefix in Celtic geographical proper names signifying the mouth or entrance of a river into the sea, or into another stream. It is used chiefly in Wales and Scotland, having the same meaning as *inver.*

Aberavon (ab-er-ā'von), a small industrial town in Glamorganshire, Wales, near the mouth of the Avon in Swansea Bay, embracing Aberavon proper and its harbor Port Talbot. There are collieries, iron works, tin and copper works, etc. Pop. 10,506.

Abercrombie (ab'er-krum-bē), JOHN, M. D., a Scottish writer on medical and moral science, and an eminent physician, born in Aberdeen, 1781, died at Edinburgh in 1844. He graduated at the university of Edinburgh in 1803, and subsequently pursued his studies in London, returning to Edinburgh in 1804, where he acquired an extensive practice as a physician. Apart from medical treatises, he is known from his *Inquiries concerning the Intellectual Powers* and his *Philosophy of the Moral Feelings.*

Abercromby (ab'er-krum'bi), or ABERCROMBIE, JAMES (1706-81), a British general, born at Glassbaugh, Scotland. After being promoted to the rank of major-general he was sent to America in 1756 and became commander-in-chief of the British and colonial forces in 1758, replacing General Loudon. He was totally incompetent. In July of 1758 he was defeated in an attack on Ticonderoga (q. v.), losing heavily in men. He had assembled 20,000 men at Albany for the attack. Montcalm, in command of the French forces, had less than 4000 men with which to oppose the overwhelming forces of Abercromby. It should have been an easy victory for the English, but after losing 2000 men, Abercromby became panic-stricken and, although his army still outnumbered that of Montcalm more than three to one, he turned tail and ran away as if from a superior force. He was superseded by Sir

Jeffrey Amherst (q. v.), who recaptured Ticonderoga (q. v.) and Crown Point (q. v.). Returning to England, he became a member of Parliament, supporting the colonial policies of George III.

Abercromby, PATRICK, a Scottish historical writer and antiquary, born at Forfar, 1656, date of death uncertain. Educated at St. Andrews and abroad, he took the degree of M. D., and practised as a physician in Edinburgh. In 1685 he was appointed physician to James II. His chief work is *Martial Achievements of the Scots Nation*, 2 vols.

Abercromby, SIR RALPH, a British general, born in 1734 in Clackmannanshire, Scotland. He entered the army in 1756 as cornet in the Third Dragoon Guards; and gradually passed through all the ranks of the service until he became a major-general in 1787. He served as lieutenant-general in Flanders, 1793-95, and was then appointed commander-in-chief of the forces in the West Indies, where he captured the islands of Grenada, St. Lucia, St. Vincent, and Trinidad, with the settlements of Demerara and Essequibo. On his return in 1798 he was appointed commander-in-chief in Ireland; and he afterwards held a corresponding command in Scotland. His next and concluding service was in the expedition to Egypt in 1801. He was killed in battle.

Aberdare (ab-er-dār'), a town of South Wales, in Glamorganshire, pleasantly situated at the junction of the Cynon and Dare, 4 miles southwest of Merthyr-Tydfil, with extensive coal and iron mines in the vicinity. Has large iron and tin works. Pop. 50,844.

Aberdeen (ab-er-dēn'), a royal and parliamentary burgh of Scotland, in the county of the same name, on the left bank of the Dee at its entrance into the North Sea, mainly situated on several slight eminences rising above the river. It is one of the oldest towns in Scotland. Constituted a royal burgh by William the Lion, 1179, it was burned by the English in 1336, but soon rebuilt, when it was called *New* Aberdeen. The streets are generally spacious and regular, the houses built of fine grayish-white granite. It has many handsome public buildings, as the County and Municipal Buildings, Marischal College, Grammar School, Infirmary, Arts School, Music Hall Buildings, etc. There is a tidal harbor of about 18 acres, and a dock 28 acres in extent. The harbor entrance is protected by a pier 2,600 feet long, and a breakwater 1,050 feet long. The shipping trade is extensive. Among the industries are woolen, cotton, jute, and linen factories, paper works, shipbuilding yards, and granite works. Pop. 165,200. —OLD ABERDEEN, a small but ancient town and royal burgh, lies about a mile north of the new town, between it and the river Don. Its chief buildings are King's College and St. Machar's Cathedral. The cathedral, now used as the parish church, was commenced about 1357. Over the Don is a fine old Gothic bridge of one arch, erected, according to some accounts, by Robert Bruce.—THE COUNTY OF ABERDEEN forms the northeastern portion of Scotland, and is bounded on the east and north by the North Sea. Area, 1,955 square miles. It is divided into six districts (Mar, Formartine, Buchan, Alford, Garioch, and Strathbogie), and is generally hilly, there being in the southwest some of the highest mountains in Scotland. Its most valuable mineral is granite, large quantities of which are exported. The principal rivers are the Dee and the Don, both of which enter the sea at the town of Aberdeen. Cereals (except wheat) and other crops succeed well, and the number of acres under cultivation is nearly double that of any other Scottish county. Great numbers of cattle are fattened and sent to London and the south. On the banks of the upper Dee is situated Balmoral, a favorite residence of Queen Victoria. Pop. 311,350.—ABERDEEN UNIVERSITY, as now constituted, derives its origin from two different foundations; one, the University and King's College (Old Aberdeen), founded in 1494 by Bishop Elphinstone, the other, Marischal College and University (New Aberdeen), founded in 1593 by Geo. Keith, Earl Marischal, by a charter ratified by act of parliament. These were incorporated into the University of Aberdeen in 1860. It is coeducational and has an average of 1200 students.

Aberdeen, a city, county seat of Brown county, South Dakota, 287 miles w. of Minneapolis, on the Chicago, Milwaukee & St. Paul, the Chicago & Northwestern, the Minneapolis & St. Louis, and the Great Northern railroads. It has a state normal school and is the principal educational, jobbing and distributing point in a large territory. There are large wholesale houses, general machinery agencies, and manufactures of candy, metal work, machine-shop and foundry products, flour, etc. Pop. (1910) 10,753; (1920) 14,537.

Aberdeen, a city of Grays Harbor county, Washington, on N. shore of Grays Harbor, on the Chehalis River, 54 miles w. of Olympia. The principal industries are lumber manufacture

(annual production, 800,000,000 feet), woodenware manufacture and salmon and clam packing. With other smaller industries a monthly pay roll was shown in 1920 of about $900,000. Pop. (1900) 3747; (1910) 13,660: (1920) 15,337.

Aberdeen, GEORGE HAMILTON GORDON, EARL OF, British statesman, born in 1784; died in 1860. He began his diplomatic life in 1801 as attaché to Lord Cornwallis's embassy to France, which resulted in the signing of the treaty of Amiens. In 1806 he entered parliament as a Scottish representative peer, and in 1813 was intrusted with a successful mission to Austria for the purpose of inducing the emperor to join the coalition of sovereigns against Bonaparte. In 1814 he was created a British peer, and in 1828 he became foreign secretary under the Duke of Wellington's administration, and in 1841 in that of Sir Robert Peel. On the death of Peel in 1850 he became regarded as the leader of the Conservative free-trade party, and on the fall of the Derby ministry in 1852 he returned to office as head of a coalition ministry. The principal event which marked his administration was the Crimean war; but the bad management of this irritated the country, and the ministry resigned in 1855. This event marks the close of Lord Aberdeen's public career.

Abergavenny (generally pron. ab-ėr-gā'ni), a town of England, in Monmouthshire. It manufactures woolens and shoes, and has a considerable trade, there being extensive coal and iron mines in the vicinity. Pop. 8511.

Abernethy (ab-ėr-neth'i), JOHN, an eminent English surgeon, of somewhat eccentric habits, born in 1764 in London, a pupil of the celebrated John Hunter. In 1787 he became assistant surgeon to St. Bartholomew's Hospital, and shortly after lecturer on anatomy and surgery. In 1815 he was elected principal surgeon, and under his auspices the hospital attained a celebrity which it had never before enjoyed. He published *Surgical Observations; The Constitutional Origin and Treatment of Local Diseases;* and *Lectures*, explanatory of Hunter's opinion of the vital processes, besides smaller essays. He died in 1831.

Aberration (ab-ėr-ra'shun), in astronomy, the difference between the true and the observed position of a heavenly body, the result of the combined effect of the motion of light and the motion of the eye of the observer caused by the annual or diurnal motion of the earth; or of the motion of light and that of the body from which the light proceeds. When the auxiliary cause is the annual revolution of the earth round the sun it is called *annual aberration*, in consequence of which a fixed star may appear as much as 20″.4 from its true position; when the auxiliary cause is the diurnal rotation of the earth on its axis it is called *diurnal aberration*, which amounts at the greatest to 0″.3; and when the auxiliary cause is the motion of the body from which the light proceeds it is called *planetary aberration*—Mental aberration, a departure from the normal mental condition.—In optics the term is used to denote the deviation of the rays of light when refracted unequally by a lens or reflected by a mirror. It is of two kinds, spherical and chromatic. Spherical aberration results in a blurring or lack of definition of the object viewed, due to the curvature of the surface of the lens or mirror used to produce the image of the object. This is not a serious defect and in practice may be treated as a negligible factor. Chromatic aberration arises from the different refrangibilities of the rays composing white light when passing through a single lens and produces an indistinct image with prismatically colored edges. This defect is corrected in practice by means of achromatic lenses which are compound lenses formed of lenses of different kinds of glass, as of crown and flint glass, and whose action depends upon the fact that there is no essential relation between refraction and dispersion. (See these nouns.) In the eye these aberrations are partially eliminated by the iris and the crystalline lens.

Aberystwyth (ab-ėr-ist'with), a seaport and fashionable watering-place of Wales, county of Cardigan, on Cardigan Bay. There is here a University College occupying a handsome Gothic building. Pop. 8412.

Abhorrers (ab-hor'rėrs), a name given in the reign of Charles II of England, 1679-80, to members of the Court party who signed addresses to the Crown, abhorring the petitions presented by certain of Shaftesbury's adherents who were termed variously Petitioners, Excluders, Addressers, Protestants, Country Party. These Addressers prayed the King for an immediate assembly of Parliament in order that the Exclusion Bill against the Duke of York might be proceeded with and that certain measures might be carried out to further the interests of the Protestant cause. The Abhorrers later were given the name of Tories and the Addressers the name of Whigs.

Abib (a'bib), the first month of the Jewish ecclesiastical year and the seventh of the civil year, corresponding

to the latter part of March and the first of April. Also called *Nisan*.

Abies (ab'i-es), a genus of coniferous trees. See *Fir* and *Spruce*.

Abilene (ab'i-lēn), a city, county seat of Dickinson county, Kansas, 163 miles W. of Kansas City, on the Smoky Hill River and four railroads. It is a shipping point for grain and cattle. There are flour mills, creameries, planing mills, and bottling works. The mineral springs in the vicinity are celebrated. Pop. (1920) 4895.

Abilene (ab'i-lēn), a city, county seat of Taylor county, Texas, 150 miles W. of Forth Worth. It is an important shipping point for grain and cattle and has cotton gins, oil mill, cotton press, also flour, grist and planing mills. Seat of Abilene Christian College. Pop. (1920) 10,274.

Abington (ab'ing-ton), a town of Plymouth county, Massachusetts, 20 miles S. E. of Boston. The principal industry is the manufacture of boots and shoes. Pop. (1920) 5787.

Abiogenesis (a-bi-ō-jen'e-sis), the doctrine or hypothesis that living matter may be produced from non-living; spontaneous generation. See *Generation* (*Spontaneous*).

Abipones (ab-i-pōn'ez), an Indian tribe of South America, dwelling in the Gran Chaco district of Paraguay. The hostility of the Spaniards forced them to move south to the territory between Santa Fé and St. Iago.

Abjuration, Oath of, an English oath (1701) by which all subjects bound themselves to renounce (abjure) the exiled Stuarts. Abjuration of the Realm was an oath which a felon who had taken sanctuary might take, to go into voluntary exile.

Abkhasia (äb-kä'se-ä), a region of Europe between the Caucasus and the Black Sea. The Abkhasians form a race distinguished from their neighbors in various respects. At one time they were Christians, but later adopted Mohammedanism. They were ruled successively by Persia, Georgia and Russia. After the Russian occupation (1829) many of them migrated into Turkish territory.

Abnakis (ab-na'kēs), a confederation of Algonquin Indian tribes in Maine and New Brunswick, hostile to the English, who defeated them and forced them to take refuge in Canada in 1724. A small body of them still live in Maine and others in Quebec.

Abney, Sir William de Wiveleslie, an English physicist, born 1844; noted for his work in photography and spectroscopy. He was president of the Royal Astronomical Society, 1893-95.

Abo (ō'bö or ą'bö), a city and port, former capital of Finland, on an arm of the Gulf of Bothnia, 128 miles W. of Helsingfors. It is an ancient city and contains many buildings of historic interest. The industries include shipbuilding, sugar refining, tobacco manufacture, etc. In 1743 the Peace of Abo, between Sweden and Russia, was signed here. A Swedish university was opened at Abo in 1919. Pop. 50,000.

Abolitionists (ab-ō-li'shun-ists), a party in the United States before the Civil war, which strongly opposed the continuation of slavery and demanded its abolition. After 1830 it spread rapidly and some of its doctrines were adopted by the Republican party when organized in 1856. It was known officially by the title of Liberty Party and ceased to exist after the Civil war.

Abomey (a'bō-mā'), a town of Dahomey, French West Africa, former capital of the Kingdom of Dahomey. The French occupied it in 1892. There is trading in ivory, palm oil and gold. Pop. 15,000.

Aborigines (ab-o-rij'i-nēz), the name given in general to the earliest known inhabitants of a country, those who are supposed to have inhabited the land from the beginning (L. *aborigine*).

Abortion (a-bōr'shun), in medicine, the expulsion of the fœtus before it is capable of independent existence. This may take place at any period of pregnancy before the completion of the twenty-eighth week. A child born after that time is said to be *premature*. Abortion may be the result of the general debility or ill health of the mother, of a plethoric constitution, of special affections of the uterus, of severe exertions, sudden shocks, etc. Various medicinal substances, generally violent emmenagogues or drastic medicines, are believed to have the effect of provoking abortion, and are sometimes resorted to for this purpose. Attempts to procure abortion are punishable by law in all civilized states.—The term is applied in botany to denote the suppression by non-development of one or more of the parts of a flower, which consists normally of four whorls—namely, calyx, corolla, stamens, and pistil.

Aboukir (à-bö-kēr'; ancient *Canōpus*), a small village on the Egyptian coast, 10 miles east of Alexandria. In Aboukir Bay took place the naval battle in which Nelson annihilated a French fleet on the night of 1st and 2d August, 1798, thus totally destroying the

naval power of France in the Mediterranean. Near this place on 25th July, 1799, Napoleon defeated the Turks under Mustapha; and on March 8, 1801, Sir Ralph Abercromby effected the landing of a British army against the French.

Abou-Simbel. See *Ipsambul.*

About (a-bö), EDMOND FRANÇOIS VALENTIN, a French novelist and miscellaneous writer, born in 1828, died in 1885. He was educated at the Lycée Charlemagne and the École Normale, Paris; was sent at government expense to the French school at Athens; on his return to Paris devoted himself to literature. Principal novels: *Tolla, Le Roi des Montagnes, Germaine, Madelon, Le Fellah, La Vieille Roche, L'Infame, Les Mariages de Province, Le Roman d'un Brave Homme*, etc.; miscellaneous works; *La Grèce Contemporaine, La Question Romaine, La Prusse en 1860, Rome Contemporaine*, etc. He was in his later years elected a member of the Academy. About wrote in a bright, humorous, and interesting style, and his novels have been very popular.

Abracadabra (a-bra-ca-dab'ra), a word of eastern origin used in incantations. When written on paper so as to form a triangle, the first line containing the word in full, the one below it omitting the last letter, and so on each time until only one letter remained, and worn as an amulet, it was supposed to be an antidote against certain diseases.

A B R A C A D A B R A
A B R A C A D A B R
A B R A C A D A B
A B R A C A D A
A B R A C A D
A B R A C A
A B R A C
A B R A
A B R
A B
A

Abraham (ā'bra-ham), originally ABRAM, the ancestor of the Hebrews appears in Genesis as a native of Ur of the Chaldees, probably in Babylonia. He migrated with his wife Sarah and his nephew Lot to Canaan, where for many years he led a nomadic life. His two sons, Isaac and Ishmael, were, according to Genesis, the progenitors of the Jews and Arabs, respectively.

Abraham, HEIGHTS OR PLAINS OF. See *Quebec.*

Abraham à Santa Clara, a German pulpit orator, real name ULRICH MEGERLE, born in 1642. As a preacher he acquired so great a reputation that in 1669 he was appointed court-preacher in Vienna, where he died in 1709. His sermons are full of homely, grotesque humor, often of coarse wit, and impartial severity towards all classes of society.

Abraham-men, originally a set of mendicant lunatics from Bethlehem Hospital, London: but as many assumed, without right, the badge worn by them the term came to signify an impostor who traveled about the country seeking alms, under the pretense of lunacy.

Ab'ramis, a genus of fishes. See *Bream.*

Abrantes (ä-brän'tes), a fortified town of Portugal, on the right bank of the Tagus (here navigable), 73 miles N. E. of Lisbon, with which it carries on an active trade. Pop. about 8000.

Abrantes, DUKE OF. See *Junot.*

Abraxas (a-braks'sas), or ABRASAX STONES, the name given to stones or gems found in Syria, Egypt, and elsewhere, cut into almost every variety of shape, but generally having a human trunk and arms, with a cock's head, two serpents' tails for the legs, etc., and the word Abraxas or Abrasax in Greek characters engraved upon them. They appear to have been first used by the Gnostic sect, and eventually came to be used as talismans.

Abrogation (ab-rō-gā'shun), the repealing of a law by a competent authority.

Abroma (a-brō'ma), a genus of small trees, natives of India, Java, etc., one species of which, *A. augusta*, has a bark yielding a strong white fiber, from which good cordage is made.

Abrus (ab'rus), a genus of papilionaceous plants, order Leguminosæ, one species of which, *Abrus precatorius*, a delicate twining shrub, a native of the East Indies, and found also in tropical parts of Africa and America, has round, brilliant scarlet seeds, used to make necklaces and rosaries. Its root is sweetish and mucilaginous, and is used as a substitute for licorice under the name of *Indian licorice.*

Abruzzi (ä-brut'sē), division of Italy on the Adriatic, between Umbria and the Marches on the north, and Apulia on the south, comprising the provinces of Chieti, Teramo and Aquila, which along with Campobasso, in Molise, form the present compartimento. Area, 6387 sq. miles; pop. 1,480,748.

Abruzzi, DUKE OF, a prince of the house of Savoy, son of Amadeus, ex-King of Spain, first cousin of

King of Italy and an Arctic and mountain explorer, was born January 29, 1873. He is an officer of the Italian navy. In 1897 he made the first ascent of Mount St. Elias and in 1900 penetrated nearer the North Pole than any previous explorer, reaching 86° 33′ N. lat., north of Franz Joseph Land. He subsequently ascended a high peak in Africa and in 1909 attempted to scale Mount Godwin Austen in the Himalayas. This cliff (28,250 feet) is the second highest known. Abruzzi reached a little over 24,000 feet, at which height he was compelled to give up the attempt.

Absalon, or AXEL, a Danish prelate, statesman, and warrior, born in 1128; died 1201 or 1202. He became the intimate friend and counselor of his sovereign, Waldemar I, who appointed him Archbishop of Lund. He cleared the sea of the Slavonic pirates who had long infested it, secured the independence of the kingdom by defeating a powerful fleet of the Emperor Barbarossa, and built the castle of Axelborg, the nucleus of Copenhagen. Turning his thoughts to literature, he caused the History of Denmark to be written by Saxo Grammaticus and Svend Aagesen.

Abscess (ab′ses), any collection of purulent matter or pus formed in some tissue or organ of the body, and confined within some circumscribed area, of varying size, but always painful and often dangerous.

Absinth, French ABSINTHE (äb-sant), a liqueur consisting of an alcoholic solution strongly flavored with an extract of several sorts of wormwood, oil of anise, etc. When taken habitually, or in excess, its effects are very pernicious. It is a favorite drink of the Parisians.

Absolution (ab-sō-lū′shun), remission of a penitent's sins in the name of God. It is commonly maintained that down to the twelfth century the priests used only what is called the *precatory formula*, 'May God or Christ absolve thee,' which is still the form in the Greek Church; whereas the Roman Catholic uses the expression, 'I absolve thee in the name of our Lord Jesus Christ,' basing this power on the authority of the New Testament. This theory of absolution was confirmed by the Council of Trent. The passages of Scripture on the basis of which the Roman Catholic Church lays down its doctrine of absolution are such as Matt. xvi, 19; xviii, 18; John xx, 23. Three forms of absolution survive in the Anglican Prayer Book, and in the Lutheran Church private confession together with certain forms of absolution existed after the Reformation.

Absorbents (ab-sōrb′ents), the system of minute vessels by which the nutritive elements of food and other matters are carried into the circulation of vertebrate animals. The vessels consist of two different sets, called respectively *lacteals* and *lymphatics*. The former arise from the digestive tract, the latter from the tissues generally, both joining a common trunk which ultimately enters the circulatory system. Absorbents in medicine are substances such as chalk, charcoal, etc., that absorb or suck up excessive secretion of fluid or gas.

Absorption (ab-sōrp′shun), in physiology, one of the vital functions by which the materials of nutrition and growth are absorbed and conveyed to the organs of plants and animals. In vertebrate animals this is done by the lymphatics and lacteals, in plants chiefly by the roots. See *Absorbents*.

In physics, *absorption of color* is the phenomenon observed when certain colors are retained or prevented from passing through transparent bodies; thus pieces of colored glass are almost opaque to some parts of the spectrum, while allowing other colors to pass through freely.

Abstraction (ab-strak′shun), the operation of the mind by which it disregards part of what is presented to its observation in order to concentrate its attention on the remainder. It is the foundation of the operation of generalization, by which we arrive at general conceptions. In order, for example, to form the conception of a horse, we disregard the color and other peculiarities of the particular horses observed by us, and attend only to those qualities which all horses have in common. In rising to the conception of an animal we disregard still more qualities, and attend only to those which all animals have in common with one another.

Abt, FRANZ, German musical composer, born 1819; died 1885; noted for his many popular songs.

Abu (*a*-bö), a granitic mountain of India in Sirohi state, Rajputana, rising precipitously from the surrounding plains, its top forming a picturesque and varied tract 14 miles long and 2 to 4 broad; highest point 5653 ft. It is a hot-weather resort of Europeans, and is the site of two most beautiful Jain temples.

Abu-Bekr (a′bū-bek′er), or FATHER OF THE VIRGIN, the father-in-law and first successor of Mohammed. His right to the succession was unsuccessfully contested by Ali, Mohammed's son-in-law, and a schism took place, which divided the Mohammedans into the two great sects of Sunnites and Shiites,

the former maintaining the validity of Abu-Bekr's and the latter that of Ali's claim.

Abu Klea (abū-kle'a), a group of wells, surrounded by steep, black mountains, about 120 miles from Khartoum, in the Soudan, where, on the 17th January, 1885, Sir Herbert Stewart, with 1500 men, defeated the Mahdi's troops, numbering 10,000.

Abulfaragius (a - būl - fä-rä'ji-us), GREGORY, a distinguished scholar, a Jew by birth (hence the name of *Barhebræus*, often given him), author of numerous works in Arabic and Syriac, was born in Armenia in 1226; died in 1286. About 1264 he was ordained bishop of Guba, afterwards of Aleppo, and about 1264 was appointed primate of the Jacobite Christians. His principal work is a *History of the World*, from the creation to his own day.

Abulfeda (a-būl-fē'da), Arab writer, Prince of Hamah, in Syria, of the same family that had produced Saladin, famous as a historian and geographer, was born at Damascus 1273; died 1331. His most important works are his *History of the Human Race* (the portion from the birth of Mohammed to his own time being valuable), and *The True Situation of Countries.*

Abutilon (a-bū'ti-lon), a genus of plants, order *Malvaceæ*, sometimes called Indian mallows, inhabiting the East Indies, Australia, Brazil, Siberia, etc. Several of them yield a valuable hemp-like fibre, as *A. indicum* and *A. avicennæ*. The latter, now a troublesome weed in the United States, has been recommended for cultivation.

Abydos (a-bī'dus). (1). An ancient city of Asia Minor, on the Hellespont, at the narrowest part of the strait, opposite Sestos. Leander, say ancient writers, swam nightly from Abydos to Sestos to see his loved Hero—a feat in swimming accomplished also by Lord Byron.—(2). An ancient city of Upper Egypt, about 6 miles west of the Nile, now represented only by ruins of temples, tombs, etc. It was celebrated as the burying-place of the god Osiris, and its oldest temple was dedicated to him. Here, in 1818, was discovered the famous *Abydos tablet*, now in the British Museum, and containing a list of the predecessors of Rameses the Great, which was supplemented by the discovery of a similar historical tablet in 1864.

Abyssal Animals (a-bis'sal), marine animal types found at depths of 2000 fathoms and more. Some of these organisms, especially fishes and crustaceans, are blind while others are provided with exceptionally large eyes. These animals show a high development of tactile organs, and a striking characteristic is their uniformity of body coloring, dark red being common to many orders of the invertebrates, a fact that has caused some speculation among naturalists as to whether the red rays of sunlight may not penetrate to these abysmal recesses. These deep-sea animals are of strictly carnivorous habit, as vegetable forms cannot exist at such depths, owing to the low temperature, a little above freezing point, and the enormous pressure, which is 9000 pounds to the square inch at soundings of 3000 fathoms. Many of these abyssal forms possess phosphorescent organs, but it is uncertain to how high a degree of emitting light their power is developed.

Abyssinia (a-bis-sin'i-a) (Arabic *Habash*), a country of Eastern Africa, which, roughly speaking, may be said to extend from lat. 6° to 15° N. and lon. 35° to 43° E.; having Eritrea on the N. E., the Soudan on the W., British East Africa on the S. and W., and Somali on the E.; total area, 350,000 sq. m. The divisions are Harar, Wollo, Kassa and Magi, Gore, Tigré, Damot and Gojam, Equator, Gondar and Jimma. It is, as a whole, an elevated region, with a general slope to the northwest. The more marked physical features are a series of tablelands, of various and often of great elevations, and numerous masses or ranges of high and rugged mountains, dispersed over the surface in wild confusion. Along the deep ravines that divide the plateaux rush numerous streams, which impart great fertility to the plains and valleys below. The mountains in various parts of the country rise to 12,000 and 13,000 feet, while some of the peaks are over 15,000 feet (Ras Dashan being 15,160), and are always covered with snow. The principal rivers belong to the Nile basin, the chief being the impetuous Tacazzé ('the Terrible') in the north, and the Abai in the south, the latter being really the upper portion of the Blue Nile. The principal lake is Lake Tzana or Dembea (from which issues the Abai), upwards of 6000 feet above the sea, having a length of about 45 and a breadth of 35 miles. Round this lake lies a fertile plain, called the granary of the country.—According to elevation there are several zones of vegetation. Within the lowest belt, which reaches an elevation of 4800 feet, cotton, wild indigo, acacias, ebony, baobabs, sugar-canes, coffee-trees, date-palms, etc. flourish, while the larger animals are lions, leopards, elephants, rhinoceroses, hippopotamuses, jackals, hyenas, numerous an

telopes, monkeys, and crocodiles. The middle zone, rising to 9000 feet, produces the grains, grasses, and fruits of southern Europe, the orange, the vine, peach, apricot, the bamboo, sycamore-tree, etc. The principal grains are millet, barley, wheat, maize, and teff, the latter a small seed, a favorite breadstuff of the Abyssinians. Two, and in some places three, crops are obtained in one year. All the domestic animals of Europe, except swine, are known. There is a variety of ox with immense horns. The highest zone, reaching to 14,000 feet, has but little wood, and generally scanty vegetation, only the hardier corn-plants being grown; but oxen, goats, and long-wooled sheep find abundant pasture.—The climate is as various as the surface, but as a whole is temperate and agreeable; in some of the valleys the heat is often excessive, while on the mountains the weather is cold. In certain of the lower districts malaria prevails.—The chief mineral products are sulphur, iron, copper, coal, and salt, the latter serving to some extent as money.—There has been a great intermixture of races in Abyssinia. What may be considered the Abyssinians proper seem to have a blood-relationship with the Bedouin Arabs. The complexion varies from very dark through different shades of brown and copper to olive. The figure is usually symmetrical. Other races are the black Gallas from the south; the Falashas, who claim descent from Abraham, and retain many Jewish characteristics; the Agows, Gongas, etc. The great majority of the people profess Christianity, belonging, like the Copts, to the sect of the Monophysites. Their religion consists chiefly in the performance of empty ceremonies, and gross superstition as well as ignorance prevails. The head of the church is called the Abuna ('our father'), and is consecrated by the Coptic patriarch of Alexandria. Geez or Ethiopian is the language of their sacred books; it has long ago ceased to be spoken. The chief spoken language is the Amharic; in it some books have been published. Mohammedanism appears to be gaining ground in Abyssinia, and in respect of morality the Moslems stand higher than the Christians. A corrupt form of Judaism is professed by the Falashas.—The bulk of the people are devoted to agriculture and cattle-breeding. The trade and manufactures are of small importance. A good deal of common cotton cloth and some finer woven fabrics are produced. Leather is prepared to some extent, silver filigree work is produced, and there are manufactures of common articles of iron and brass, coarse black pottery, etc. A small foreign trade used to be carried on through Massowa, on the Red Sea (now in the hands of the Italians), the principal exports being hides, coffee, honey, wax, gum, ivory, etc., the imports textile fabrics, fire-arms, tobacco, etc.—The Abyssinians were converted to Christianity in the fourth century, by some missionaries from Alexandria. In the sixth century the power of the sovereigns of their kingdom, which was generally known as Ethiopia, had attained its height; but before another had expired the Arabs had invaded the country, and obtained a footing. For several centuries subsequently the kingdom continued in a distracted state, being now torn by internal commotions and now invaded by external enemies (Mohammedans and Gallas). To protect himself from the last the Emperor of Abyssinia applied, about the middle of the sixteenth century, to the King of Portugal for assistance, promising, at the same time, implicit submission to the pope. The solicited aid was sent, and the empire saved. The Roman Catholic priests endeavored to induce the emperor and his family to renounce the tenets and rites of the Coptic Church, and to adopt those of Rome. This attempt, however, was resisted by the ecclesiastics and the people, and ended, after a long struggle, in the expulsion of the Catholic priests about 1630. The kingdom gradually fell into a state of anarchy, and was broken up into several independent states. An attempt to revive the power of the ancient kingdom of Ethiopia was commenced about the middle of the present century by King Theodore. He introduced European artisans, and went to work wisely in many ways, but his cruelty and tyranny counteracted his politic measures. In consequence of a slight, real or fancied, which he had received at the hands of the British government, he threw Consul Cameron and a number of other British subjects into prison, in 1863, and refused to give them up. To effect their release an army of nearly 12,000 men, under Sir Robert (afterwards Lord) Napier, was dispatched from Bombay in 1867. After being defeated in a battle Theodore delivered up the captives and shut himself up in Magdala, which was taken by storm on the 13th April, Theodore being found among the slain. The withdrawal of the British was followed by fighting for supremacy among the chiefs, Kasa (who assumed the name of King Johannes) gaining control of the northern provinces and Menelek of Shoa. Later Johannes became supreme and in 1881 assumed the title of emperor (*negus*

negust—king of kings), having under him the Kings of Shoa and Gojam. Advantage was taken of the troubles in Abyssinia by the Egyptians in the north and the Gallas in the south to acquire additional territory at its expense. Egypt annexed the region round Massowa, Abyssinia being shut out from the sea. Johannes was succeeded in 1889 by Menelek II, who placed the kingdom under an Italian protectorate. Disputes about the text of the treaty followed, hostilities broke out and the Italians met with complete defeat in 1896, the country being freed from foreign control. Menelek died in 1913 and was succeeded by his 15-year-old grandson, Prince Lidj Yasu. In September, 1916, Lidj was deposed and his aunt, Waizeru Zaudita, daughter of Menelek II, became Empress of Abyssinia. In 1917 a revolution was started with the object of overthrowing the Empress, but it was quelled. The population is estimated at 8,000,000.

Acacia (a-cā'shi-a), a genus of plants, nat. order Leguminosæ, sub-order Mimoseæ, consisting of trees or shrubs with compound pinnate leaves and small leaflets, growing in Africa, Arabia,

Acacia (*Acacia seyal*).

the East Indies, Australia, etc. The flowers, usually small, are arranged in spikes or globular heads at the axils of the leaves near the extremity of the branches. The corolla is bell or funnel shaped; stamens are numerous; the fruit is a dry, unjointed pod. Several of the species yield gum arabic and other gums; some have astringent barks and pods, used in tanning. *A. catechu*, an Indian species, yields the valuable astringent called catechu: *A. dealbāta*, the wattle-tree of Australia, from 15 to 30 feet in height, is the most beautiful and useful of the species found there. Its bark contains a large percentage of tannin, and is hence exported. Some species yield valuable timber; some are cultivated for the beauty of their flowers.

Academy (a-cad'e-mi), an association for the promotion of literature, science, or art; established sometimes by government, sometimes by the voluntary union of private individuals. The name academy was first applied to the philosophical school of Plato, from the place where he used to teach, a grove or garden at Athens which was said to have belonged originally to the hero Academus. Academies devote themselves either to the cultivation of science generally or to the promotion of a particular branch of study, as antiquities, language, and the fine arts. The most celebrated institutions bearing the name of academies, and designed for the encouragement of science, antiquities, and language respectively, are the French Académie des Sciences (founded by Colbert in 1666), Académie des Inscriptions (founded by Colbert in 1663), and Académie Française (founded by Richelieu in 1635), all of which are now merged in the National Institute. The oldest of the academies instituted for the improvement of language is the Italian Accademia della Crusca (now the Florentine Academy), formed in 1582, and chiefly celebrated for the compilation of an excellent dictionary of the Italian language, and for the publication of several carefully prepared editions of ancient Italian poets. In Britain the name of academy, in the more dignified sense of the term, is confined almost exclusively to certain institutions for the promotion of the fine arts, such as the Royal Academy of Arts and the Royal Scottish Academy. The Royal Academy of Arts (usually called simply the Royal Academy) was founded in London in 1768, 'for the purpose of cultivating and improving the arts of painting, sculpture, and architecture.' The Royal Scottish Academy of Painting, Sculpture, and Architecture was founded in 1826 and incorporated in 1838. It consists of thirty academicians and twenty associates. The Royal Hibernian Academy at Dublin was incorporated in 1823, and reorganized in 1861. It consists of thirty members and ten associates. The American Philosophical Society, the oldest

scientific institution in America, was organized in 1744, in Philadelphia. The Academy of Natural Sciences of Philadelphia was organized in 1812, and the Academy of Fine Arts in 1805. The American Academy of Arts and Sciences, incorporated in 1780, is located at Boston, as also the Society of Natural History. The Connecticut Academy of Arts and Sciences was organized in New Haven in 1799. The New York Academy of Sciences was incorporated as the Lyceum of Natural History in 1818. The Peabody Academy of Sciences, Salem, Mass., was endowed by George Peabody in 1867. The Smithsonian Institution, Washington, D. C., was incorporated by Congress, in 1846. The National Academy of Sciences was founded at Washington, 1856. The American Academy of Arts and Letters was organized in 1904, with a limited membership of 50, of persons who had made notable achievements in art, music or literature. There are active Academies in Cincinnati, St. Louis, Chicago, San Francisco, New Orleans and other cities.

Acadia (a-kā′di-a; French *Acadie*), the French name of Nova Scotia. It received its first colonists from France in 1604, being then a possession of that country, but it passed to Britain, by the Peace of Utrecht, in 1713. In 1755, 18,000 of the French inhabitants were forcibly removed from their homes on account of their hostility to the British, an incident on which is based Longfellow's *Evangeline*. See *Nova Scotia*.

Acadia University, a Canadian institution for higher learning at Wolfville, Nova Scotia, founded in 1838. It is under the control of the Baptist church. Average number of students, 250.

Acajutla (ä-kä-höt′la), the port of both Sonsonate and San Salvador in Salvador; connected with these cities by a narrow-gauge railway; the gateway for a constantly increasing trade.

Acalephæ (ak-a-lē′fē), another term for *Discophora* (q. v.).

Acanthaceæ (a-kan-tha′se-ē), or ACANTHADS, a natural order of dicotyledonous herbaceous plants or shrubs, with opposite leaves and monopetalous corolla, mostly tropical; species about 1400. See *Acanthus*.

Acanthite (a-kan′thīt), a silver sulphide (Ag_2S), crystallizing in the orthorhombic system. It is found with other ores in Saxony and elsewhere in Germany.

Acanthopteri, ACANTHOPTERYGII (a-kan-thop-te-rij′i-ī) (Gr. *akantha*, a spine, *pterygion*, a fin), a group of fishes, distinguished by the fact that at least the first rays in each fin exist in the form of stiff spines; it includes the perch, mullet, mackerel, gurnard, wrasse, etc.

Acanthus (a-kan′thus), a genus of herbaceous plants or shrubs, order, Acanthaceæ, mostly tropical, two species of which, *A. mollis* and *A. spinōsus* (the bear's-breech or brankursine), are characterized by large white flowers and deeply indented, shining leaves. They are favorite ornamental plants.—In architecture the name is given to a kind of foliage decoration said to have been suggested by this plant, and much employed in Greek and later styles.

Acanthus of Corinthian Capital.

Acapulco (ä-kä-pöl′kō), a seaport of Mexico, on the Pacific, with a capacious, well-sheltered harbor; a coaling station for steamers, but with no great trade. Pop. 5800.

Acarida (a-kar′i-da), a division of the *Arachnida*, including the mites, ticks, and water-mites. See *Mite*.

Acarnania (ak-ar-nā′ni-a), the most westerly portion of Northern Greece, together with Ætolia now forming a nomarchy. The Acarnanians of ancient times were behind the other Greeks in civilization, living by robbery and piracy. Pop. 175,000.

Acarus (ak′a-rus, pl. acari), the genus to which the mite belongs.

Accad or AK′KAD, the N. W. division of ancient Babylonia, Sumir forming the S. E. The Accadians were the dominant people at the time of the earliest records. They had descended from the mountainous region of Elam on the east, and the Assyrians ascribed to them the origin of Chaldean civilization and writing. This race is believed to have belonged to the Turanian family, from the character of its language. What is known of them has been learned from the cuneiform inscriptions.

Acceleration (ak-sel-e-rā′shun), the increase of velocity which a body acquires when continually acted upon by a force in the direction of its motion. A body falling from a height is one of the most common instances of acceleration.—ACCELERATION OF THE MOON, the increase of the moon's mean angular velocity about the earth, the moon now moving rather faster than in

ancient times. This phenomenon has not been fully explained, but it is known to be partly owing to the slow process of diminution which the eccentricity of the earth's orbit is undergoing, and from which there results a slight diminution of the sun's influence on the moon's motions. —DIURNAL ACCELERATION OF THE FIXED STARS, the apparent greater diurnal motion of the stars than of the sun, arising from the fact that the sun's apparent yearly motion takes place in a direction contrary to that of its apparent daily motion. The stars thus seem each day to anticipate the sun by nearly 3 minutes 56 seconds of mean time.

Accent (ak'sent), a term used in several senses. In English it commonly denotes superior stress or force of voice upon certain syllables of words, which distinguishes them from the other syllables. Many English words, as *as'pira''tion*, have two accents, a secondary and primary, the latter being the fuller or stronger. Some words, as *in-com'prehen'si-bil''ity*, have two secondary or subordinate accents. When the full accent falls on a vowel, that vowel has its long sound, as in *vo'cal;* but when it falls on a consonant, the preceding vowel is short, as in *hab'it.* This kind of accent alone regulates English verse as contrasted with Latin or Greek verse, in which the metre depended on *quantity* or length of syllables. In books on elocution three marks or accents are generally made use of, the first or *acute* (′) showing when the voice is to be raised, the second or *grave* (`), when it is to be depressed, and the third or *circumflex* (^) when the vowel is to be uttered with an undulating sound. In some languages there is no such distinct accent as in English (or German), and this seems to be now the case with French.—In music, accent is the stress or emphasis laid upon certain notes of a bar. The first note of a bar has the strongest accent, but weaker accents are given to the first notes of subordinate parts of the bars, as to the third, fifth, and seventh in a bar of eight quavers.

Accentor (*Accentor modulāris*), or HEDGE ACCENTOR, a genus of seed and insect-eating passerine birds, very common throughout Europe.

Acceptance (ak-sep'tans), in law, the act by which a person binds himself to pay a bill of exchange drawn upon him. (See *Bill.*) No acceptance is valid unless made in writing on the bill, but an acceptance may be either absolute or conditional, that is, stipulating some alteration in the amount or date of payment, or some condition to be fulfilled previous to payment.

Accessary (ak-ses'a-ri, ak'se-sā-ri) or ACCESSORY, in law, a person guilty of an offense by connivance or participation, either before or after the act committed, as by command, advice, concealment, etc. An accessary *before the fact* is one who procures or counsels another to commit a crime, and is not present at its commission; an accessary *after the fact* is one who, knowing a felony to have been committed, gives assistance of any kind to the felon so as to hinder him from being apprehended, tried, or suffering punishment. An accessary before the fact may be tried and punished in all respects as if he were the principal. In high treason, all who participate are regarded as principals.

Accidentals (ak-si-den'tals), notes introduced in the course of a piece of music in a different key from that in which the passage they occur is principally written. They are represented by the sign of a sharp, flat, or natural immediately before the note which is to be raised or lowered.

Accipitres (ak-sip'i-trēz), the name given by Linnæus and Cuvier to the rapacious birds now usually called Raptores (which see).

Acclimatization (a-klī-ma-ti-zā'-shun), the process of accustoming plants or animals to live and propagate in a climate different from that to which they are indigenous, or the change which the constitution of an animal or plant undergoes under new climatic conditions, in the direction of adaptation to those conditions. The term is sometimes applied to the case of animals or plants taking readily to a new country with a climate and other circumstances similar to what they have left, such as European animals and plants in America and New Zealand: but this is more properly *naturalization* than acclimatization.

Accolade (ak-o-lād'; French, from L. *ad*, to, *collum*, the neck), the ceremony used in conferring knighthood, anciently consisting either in the embrace given by the person who conferred the honor of knighthood or in a light blow on the neck or the cheek, subsequently consisting in the ceremony of striking the candidate with the flat of a naked sword.

Accol'ti, BENEDETTO, an Italian lawyer, born at Arezzo in Tuscany in 1415, died 1466. He was secretary to the Florentine republic, 1459 and author of a work on the Crusades which

is said to have furnished Tasso with matter for his *Jersualem Delivered.*

Accommodation Bill, a bill of exchange drawn and accepted to raise money on, and not given, like a genuine bill of exchange, in payment of a debt, but merely intended to accommodate the drawer.

Accommodation Ladder, a light ladder hung over the side of a ship at the gangway to facilitate ascending from or descending to boats.

Accompaniment (a-kum'pa-ni-ment), in music, is that part of music which serves for the support of the principal melody (solo or obligato part). This can be executed either by many instruments, by a few, or by a single one.

Accordion (a-kor'di-un), a keyed musical wind instrument similar to the concertina, being in the form of a small box, containing a number of metallic reeds fixed at one of their extremities, the sides of the box forming a folding apparatus which acts as a bellows to supply the wind, and thus set the reeds in vibration, and produce the notes both of melody and harmony.

Accra (äk'kra), a British settlement in Africa, capital of the colony of Gold Coast, about 75 miles east of Cape Coast Castle. Exports, gold dust, ivory, gums, palm-oil; imports, cottons, cutlery, firearms, etc. Pop. about 20,000.

Accrington (ak'kring-tun), a municipal bor. of Lancashire, England, 19 miles north of Manchester, with large cotton factories, print-works, and bleach-fields, and coal-mines adjacent. Pop. 45,031.

Accumulator. See *Electric Storage Battery.*

Aceldama (a-sel'dā-ma; "the field of blood"), in Acts i, 13 the name given to the field purchased by Judas Iscariot with the money he had received for the betrayal of Christ. The traditional site (now Hakel-Dum), south of Jerusalem on the northeast slope of the 'Hill of Evil Counsel,' was used as a burial-place for Christian pilgrims from the 6th century A.D. till as late as 1697. Near it is an ancient charnel-house, partly rock-cut and partly of masonry, said to be the work of Crusaders.

Acephala (a-sef'a-la), in zoology, the headless Mollusca or those which want a distinct head, corresponding to those that have bivalve shells and are also called *Lamellibranchiata.*

Acer (ā'ser), the genus of plants (natural order *Aceraceæ*) to which belong the maples.

Acerra (å-cher'å), a town in South Italy, 7 miles northeast of Naples, the see of a bishop. Here are sulphur and mineral springs. Pop. 16,443.

Acerraderos (a*th*-er-ra-dā'ros), a town in the province of Santiago, Cuba, where General Shafter and Admiral Sampson arranged with General Garcia, the Cuban leader, for the cooperation of the Cuban forces in the Santiago campaign, 1898.

Acetabulum (as-e-tab'ū-l u m), an anatomical term applied to any cup-like cavity, as that of a bone to receive the protuberant end of another bone, the cavity, for instance, that receives the end of the thigh-bone.

Acetates (as'e-tāts), salts of acetic acid. The acetates of most commercial or manufacturing importance are those of aluminium and iron, which are used in calico-printing; of copper, which as verdigris is used as a color; and of lead, best known as sugar of lead. The acetates of potassium, sodium, and ammonium, of iron, zinc, and lead, and the acetate of opium are employed in medicine.

Acetic Acid (a-set'ik, a-sē'tik), an acid produced by the oxidation of common alcohol and of many other organic substances. Pure acetic acid has a very sour taste and pungent smell, burns the skin, and is poisonous. From freezing at ordinary temperatures (58° or 59°) it is known as *glacial acetic acid.* Vinegar is simply dilute acetic acid, and is prepared by subjecting wine or weak spirit to the action of the air; also from malt which has undergone vinous fermentation. Acetic acid, both concentrated and dilute, is largely use in the arts, in medicine, and for domestic purposes. See *Vinegar.*

Acetic Ethers, compounds consisting of acetates of alcohol radicals. Common acetic ether is a colorless, volatile fluid, and is a flavoring constituent in many wines. It is made artificially by distilling a mixture of alcohol, oil of vitriol, and acetate of sodium.

Acetones (as'e-tōns), or Ketones, are the aldehydes of the secondary alcohols. A series of these is known, of which acetone is the type. It is a limpid liquid, with a taste like peppermint, a solvent for gums and also guncotton. By distilling it with bleaching powder chloroform is produced.

Acetylene A gas compounded of carbon and hydrogen, indicated by the formula $C_2 H_2$. It is without color and has a very acrid and penetrating odor until the sulphuretted and phosphoretted hydrogen has been removed. Its

density is 0.92. It is less poisonous than carbon monoxide and even coal gas. Condensation into a liquid state can be effected by cold or pressure; the latter method showing that at a temperature of 0^0 C. a pressure of 2.53 atmospheres suffices, the pressure required increasing with the rise and decreasing with the fall of the temperature. It will become liquid under normal atmosphere pressure at -82^0 C. Acetylene is of great importance commercially, chiefly for illumination and in the industrial arts for welding and cutting metals by means of the oxygen-acetylene blow-pipe. The combination of these gases in proper proportion burns with a very intense heat and is applicable to the working of metals with a high melting point, such as iron and steel. Acetylene gas for this purpose is now supplied in convenient form in steel cylinders of various capacities. These cylinders are filled with dissolved acetylene gas by packing them with a porous substance soaked with a liquid, such as acetone, which has the property of dissolving acetylene. Gas is pumped into a cylinder under pressure until it contains about 150 times its own volume and slowly released by the solvent as it is used. See *Oxy-Acetylene Welding.*

Acetylene gas is produced through the decomposition of carbide by water, either by dropping carbide into water or water on carbide. The former is the most approved method and the safest, as the carbide is thrown into a considerable mass of water and the chances of explosive effects are greatly minified, whereas in the latter method the water dropping in the mass of carbide on irregular evolution of gas may result, but the danger of an explosion is increased. On the purity of the acetylene also safety depends in large measure. There are various methods of purifying it, but the chief consideration is to obtain a pure carbide. Acetylene is highly explosive in certain mixtures, as with air or oxygen; even friction on the surface of the vessels containing such mixtures may effect an explosion. It is also explosive when isolated and pure if it is kept under pressure of more than two atmospheres. In the liquid form it is extremely dangerous, but it may be stored in solution in acetone, and, if the pressure used in dissolving it is not very great, an explosion could only occur in the gaseous volume above the surface of the liquid, the dissolved portion would not contribute to the explosion. It has been rather commonly supposed that when acetylene is brought into contact with metallic copper or its alloys an explosive compound forms; this, however, is demonstrated to be a false assumption. The gas may be stored in any metallic container. Owing to the high carbon content in acetylene, it evolves great heat in combustion. To this quality is due its power as an illuminant, the temperature being high enough to maintain incandescence of the carbon particles in the flame.

The use of acetylene for lighting purposes is considerable. It is employed in street lamps, as well as for domestic use, and for motor vehicles, but the wider use of the gas has probably been checked by the fear of its explosive quality. It is an economical light, but special burners are required which admit the mixture of a certain quantity of air with the gas before the point is reached where combustion takes place. Besides pure acetylene, mixtures of this gas and nitrogen, marsh gas, or carbonic acid gas may be used. In addition acetylene can be used to enrich coal gas and other combustible gases, but the cost of carbide limits this use. A product of acetylene is *di-iodoform*, $C_2 I_4$, which results from passing the gas into a solution of iodine. This product has the advantage over the ordinary iodoform of the absence of the irritating odor of that antiseptic while possessing equal antiseptic value. Acetylene combines directly with nitrogen under the action of electric sparks and forms prussic acid. Alcohol is also derivable from it, through an ethylene acted upon by sulphuric acid and water, the ethylene itself resulting from the heating of the acetylene with hydrogen. This process, however, is too expensive for ordinary commercial use.

In the chemical sense acetylene is an unsaturated compound, inasmuch as it combines with bromine and other halogens without losing its own elements. Similarly it combines with hydrogen, and, by heating a mixture of these, ethylene gas may be obtained, as is indicated above, and by the action of hydrogen in the presence of 'platinum black,' or finely divided platinum, the ethylene is transformed into ethane gas. Another important use of acetylene is in the manufacture of sugar, according to a German patent. Mention should be made of another product of acetylene, *copper acetylide*, which results from passing acetylene into a solution of a cuprous salt, as cuprous chloride, in which some ammonia is present.

Achæans (a-kē'anz), one of the four races into which the ancient Greeks were divided. In early times they inhabited a part of Northern Greece and of the Peloponnesus, known as Achaia. They are represented by Homer as a brave and warlike people.

1. A confederacy or league, known as the Achæan League, existed among the twelve towns of this region. It was dissolved about 288 B. C. by Antigonus Gonatus.

2. A political federation of Achæan

and other Greek cities, 281 to 146 B. C., said to be the most perfect type of federal government which has been handed down by antiquity. It was destroyed by the Romans in 146 B. C., and with it fell the last stronghold of liberty in Greece.

Achæmenidæ (a-k-ē-men'i-dē), a dynasty of ancient Persian kings, being that to which the great Cyrus belonged.

Achaia (a-kā'ya), a small Greek district on the north coast of the Peloponnesus, famed in ancient times for its production of fruits, oil and wine, still largely produced in the modern Achaia, one of the departments of the kingdom of Greece; chief town of Patras, known in ancient days as Patræ. The Achaians (Achæans) were the ruling people of the Peloponnesus. Achaia, or Achæa, in the southeastern part of Thessaly, is supposed to have been the home of Achilles. It is in ancient Achaia that the best example of the federal system is found. The Achæan league has a representative assembly which for many years held sway. (See *Achæans.*)

Achalzich (ä-*h*āl'tsē*h*), a fortified town of Russia, in Transcaucasia, 70 miles east of the Black Sea. Pop. 18,000.

Achard (å*h*'art), FRANZ KARL, a German chemist, born in 1753; died 1821, principally known by his invention (1789-1800) of a process for manufacturing sugar from beet-root.

Achard (å-shär), LOUIS AMÉDÉE EUGÈNE, born 1814; died 1875, a French journalist, novelist, and playwright. Best known as a novelist; wrote the novels *Belle Rose, La Chasse royale, Châteaux en Espagne, Robe de Nessus, Châines de fer,* etc.

Achates (a-kā'tēz), a companion of Æneas in his wanderings subsequent to his flight from Troy. He is always distinguished in Virgil's *Æneid* by the epithet *fidus,* 'faithful,' and has become typical of a faithful friend and companion.

Acheen, or ACHIN (ä-chēn'), a native state of Sumatra, with capital of same name, in the northwestern extremity of the island, now nominally under Dutch administration. Though largely mountainous, it has also undulating tracts and low, fertile plains. By treaty with Britain the Dutch were prevented from extending their territory in Sumatra by conquest; but this obstacle being removed, in 1871 they proceeded to occupy Acheen. It was not till 1879, however, after a great waste of blood and treasure, that they obtained a general recognition of their authority. But they have not been able to establish it firmly, and in 1885 were forced to evacuate part of the Acheenese territory, with considerable loss in men and guns. In the seventeenth century Acheen was a powerful state, and carried on hostilities successfully against the Portuguese, but its influence decreased with the increase of the Dutch power. The principal exports are rice and pepper. Area, 20,500 sq. miles; population, according to recent calculation, 110,000 (by some estimated to be much larger).

Achelous (ak-e-lō'us), now *Aspropotămo,* the largest river of Greece rising on Mount Pindus, separating Ætolia and Acarnania, and falling into the Ionian Sea.

Achenbach (å'*h*en-bȧch), ANDREAS, was a distinguished and prolific German landscape and marine painter, born in 1815; died in 1910.—OSWALD ACHENBACH, born 1827; died 1905, brother of above, was also a distinguished landscape painter.

Achene, ACHENIUM (a-kēn', a-kē'ni-um), in botany a small, dry carpel containing a single seed, the pericarp of which is closely applied but separable, and which does not open when ripe. It is either solitary or several achenia may be placed on a common receptacle, as in the buttercup.

Achene—Lettuce and Ranunculus.

Acheron (ak'e-ron), the ancient name of several rivers in Greece and Italy, all of which were connected by legend with the lower world. The principal was a river in Epirus, which passes through Lake Acherusia and flows into the Ionian Sea. Homer speaks of Acheron as a river of the lower world, and late Greek writers use the name to designate the lower world.

Achiar, ATCH'AR, an Indian condiment made of the young shoots of the bamboo pickled.

Achievement (a-chēv'ment), in heraldry, a term which may be applied to the shield of armorial bearings generally, but is usually applied to the shield or hatchment which is affixed to the house of persons lately deceased, to denote their rank and station.

Achill (ak'il), or EAGLE ISLAND, the largest island on the Irish coast; separated from the mainland of Connaught by a narrow sound; area, 51,521 acres, mostly irreclaimable bog. The chief occupation of the natives is fishing. Pop. 4929.

Achillæa, the milfoil genus of plants.

Achilles (a-kil'ēz), a Greek legendary hero, the chief character in Homer's *Iliad*. His father was Peleus, ruler of Phthia in Thessaly, his mother the sea-goddess Thetis. When only six years of age he was able to overcome lions and bears. His guardian, Cheiron the Centaur, having declared that Troy could not be taken without his aid, his mother, fearing for his safety, disguised him as a girl, and introduced him among the daughters of Lycomedes of Scyros. Her desire for his safety made her also try to make him invulnerable when a child by anointing him with ambrosia, and again by dipping him in the river Styx, from which he came out proof against wounds, all but the heel, by which she had held him. His place of concealment was discovered by Odysseus (Ulysses), and he promised his assistance to the Greeks against Troy. Accompanied by his close friend, Patroclus, he joined the expedition with a body of followers (Myrmidons) in fifty ships, and occupied nine years in raids upon the towns neighboring to Troy, after which the siege proper commenced. On being deprived of his prize, the maiden Briseïs, by Agamemnon, he refused to take any further part in the war, and disaster attended the Greeks. Patroclus now persuaded Achilles to allow him to lead the Myrmidons to battle dressed in his armor. He was slain by Hector and Achilles vowed revenge on the Trojans, whom he attacked and drove back to their walls, slaying them in great numbers, chased Hector, who fled before him three times round the walls of Troy, slew him, and dragged his body at his chariot-wheels, but afterwards gave it up to Priam, who came in person to beg for it. He then performed the funeral rites of Patroclus, with which the *Iliad* closes. He was killed in a battle at the Scæan Gate of Troy by an arrow from the bow of Paris, which struck his vulnerable heel. In discussions on the origin of the Homeric poems the term *Achilleid* is often applied to those books (i, viii, and xi–xxii) of the *Iliad* in which Achilles is prominent, and which some suppose to have formed the original nucleus of the poem.

Achilles Tendon, or TENDON OF ACHILLES, the strong tendon which connects the gastrocnemius muscles of the calf of the leg with the heel, and may be easily felt with the hand. The origin of name will be understood from above article.

Achilles Tatius (a-kil'ēz ta'shi-us), a Greek romance writer of the fifth century A. D., belonging to Alexandria; wrote a love story called *Adventures of Leucippē and Cleitophon.*

Achimenes (a-kim'e-nēz), a genus of tropical American plants, with scaly underground tubers, nat. order Gesneraceæ, now cultivated in European greenhouses on account of their ornamental character.

Achlamydeous (ak-la-mid'e-us), in botany, wanting the floral envelopes; that is, having neither calyx nor corolla, as the willow.

Achor (ā'kor), a disease of infants, in which the head, the face, and often the neck and breast become incrusted with thin, yellowish or greenish scabs, arising from minute, whitish pustules, which discharge a viscid fluid.

Achromat'ic (Gr. *a*, priv., and *chrōma, chrōmatos*, color), in optics, transmitting colorless light; that is, light not decomposed into the primary colors, though having passed through a refracting medium. A single convex lens does not give an image free from the prismatic colors, because the rays of different color making up white light are not equally refrangible, and thus do not all come to a focus together, the violet, for instance, being nearest the lens, the red farthest off. If such a lens of crown-glass, however, is combined with a concave lens of flint-glass—the curvatures of both being properly adjusted—as the two materials have somewhat different optical properties, the latter will neutralize the chromatic aberration of the former, and a satisfactory image will be produced. Telescopes, microscopes, etc., in which the glasses are thus composed are called *achromatic.*

Acid (as'id, Latin, *acidus*, sour), a name popularly applied to a number of compounds, solid, liquid, and gaseous, having more or less the qualities of vinegar (itself a diluted form of acetic acid), the general properties assigned to them being a tart, sour taste, the power of changing vegetable blues into reds, of decomposing chalk and marble with effervescence, and of being in various degrees neutralized by alkalies. An acid has been defined as a substance containing hydrogen, which is partly or fully replaceable by a metal when presented in the form of a hydrate. The acid is distinguished as being *monobasic, dibasic.* or *tribasic*, according to the number of hydrogen atoms replaced.

Acidimeter (as-id-im'e-ter), an instrument for ascertaining the strength of acids.

Acierage (ā'sē-ėr-āj) (Fr. *acier*, steel), a process by which an engraved copper plate or an electrotype

from an engraved plate of steel or copper has a film of iron deposited over its surface by electricity in order to protect the engraving from wear in printing. By this means an electrotype of a fine engraving, which, if printed directly from the copper, would not yield 500 good impressions, can be made to yield 3000 or more; and when the film of iron becomes so worn as to reveal any part of the copper, it may be removed and a fresh coating deposited so that 20,000 good impressions may be got.

Acipenser (as-i-pen'sėr), the genus of cartilaginous ganoid fishes to which the sturgeon belongs.

Aci Reale (ä'chē rā-ä'lā) a seaport of Sicily, northeast of Catania, a well-built town, with a trade in corn, wine, fruit, etc. In its vicinity are the cave of Polyhemus and grotto of Galatea. Pop. 35,418. (See next article.)

Acis (ā'sis), according to Ovid, a beautiful shepherd of Sicily, loved by Galatea, and crushed to death by his rival the Cyclops Polyphemus. His blood, flowing from beneath the rock which crushed him, was changed into a river bearing his name.

Aclin'ic Line (Gr. priv. *a*, *klinō*, to incline), the magnetic equator, an irregular curve in the neighborhood of the terrestrial equator, where the magnetic needle balances itself horizontally, having no dip.

Acne (ak'nē), a skin disease, consisting of small, hard pimples, usually on the face, caused by congestion of the follicles of the skin.

Acolytes (ak'o-līts), in the ancient Latin and Greek churches, persons of ecclesiastical rank next in order below the subdeacons, whose office it was to attend to the officiating priest. The name is still retained in the Anglican and R. Catholic Churches.

Aconcagua (å-kon-kä'gwå), a province, a river, and a mountain of Chile. The peak of Aconcagua, rising to the height of 23,080 feet, is one of the highest summits of the western hemisphere. Area of province, about 6000 sq. miles. Pop. 131,255.

Aconite (ak'o-nīt; *aconitum*), a genus of herbaceous plants, nat. order Ranunculaceæ, represented by the well-known wolf's bane or monk's-hood, and remarkable for their poisonous properties and medicinal qualities, being used internally as well as externally in rheumatism, gout, neuralgia, fever, etc. See next article.

Aconitine (a-kon'i-tin), an alkaloid extracted from monk's-hood and some other species of aconite; used medicinally, though a virulent poison.

Aconguija (å-kon-gē'*hå*), a range of mountains in the Argentine Republic; the name also of a single peak 17,000 feet high.

Acorn (ā'korn), the fruit of the different kinds of oak. The acorn-cups of one species are brought from the Levant under the name of *valonia*, and used in tanning.

Acorn-shell. See *Balanus*.

Acorus (ak'ō-rus), a genus of plants, including the sweet-flag. See *Sweet-flag* and *Calamus*.

Acos'ta, Gabriel, afterwards Uriel, a Portuguese of Jewish descent, born 1590, died by his own hand 1647. Brought up a Christian, he afterwards embraced Judaism. Having gone to Amsterdam, where he attacked the practices of the Jews, and denied the divine mission of Moses, he suffered much persecution at the hands of the Jews. He left an autobiography, published in 1687, under the title *Exemplar Vitæ Humanæ*.

Acotyledons (a-kot-i-lē'duns), plants not furnished with cotyledons or seed-lobes. They include ferns, mosses, sea-weeds, etc., and are also called flowerless plants or cryptogams.

Acoustics (a-kou'stiks), the science of sound. It teaches the cause, nature, and phenomena of such vibrations of elastic bodies as affect the organ of hearing, the properties and effects of different sounds, including musical sounds or notes, and the structure and action of the organ of hearing, etc. The propagation of sound is analogous to that of light, both being due to vibrations which produce successive waves, and Newton was the first to show that its propagation through any medium depended upon the elasticity of that medium. Regarding the intensity, reflection, and refraction of sound, much the same rules apply as in light. Though the vibrations of sound are longitudinal in direction, while those of light are transverse, the rapidity of audible sound vibrations varies from about 24 to about 40,000 per second. In ordinary cases of hearing the vibrating medium is air, but all substances capable of vibrating may be employed to propagate and convey sound. When a bell is struck its vibrations are communicated to the particles of air surrounding it, and from these to particles outside them, until they reach the ear of the listener. The intensity of sound varies inversely as the square of the distance of the body sounding from the ear. **Sound**

travels through the air at the rate of about 1090 feet per second; through water at the rate of about 4700 feet. Sounds may be musical or non-musical. A musical sound is caused by a regular series of exactly similar pulses succeeding each other at precisely equal intervals of time. If these conditions are not fulfilled the sound is a noise. Musical sounds are comparatively simple, and are combined to give pleasing sensations according to easy numerical relations. The *loudness* of a note depends on the *degree* to which it affects the ear; the *pitch* of a note depends on the *number* of vibrations to the second which produce the note; the *timbre, quality*, or *character* of a note depends on the *body* or *bodies* whose vibrations produce the sound, and is due to the form of the paths of vibrating particles. The gamut is a series of eight notes, which are called by the names Do, Re, Mi, Fa, So, La, Ti, Do_2, and the numbers of vibrations which produce these notes are respectively proportional to 24, 27, 30, 32, 36, 40, 45, 48. The numerical value of the interval between any two notes is given by dividing one of the above numbers corresponding to the higher note by the number corresponding to the lower note. The intervals from Do to each of the others are called a *second*, a *major third*, a *fourth*, a *fifth*, a *sixth*, a *seventh*, and an *octave*, respectively. The interval from La to Do_2 is a *minor third*. An interval of $\frac{9}{8}$ is a *major tone;* $\frac{10}{9}$ is a *minor tone;* $\frac{16}{15}$ is called a *limma*. The properties of sound were mathematically investigated by Bacon and Galileo, but it remained for Newton, Lagrange, Euler, Laplace, Helmholtz, etc., to bring the science to its present state.

Acqui (ăk'wē), a town of Northern Italy 18 miles S.S.W. of Alessandria, a bishop's see. It has warm sulphurous baths, which were known to the Romans, and which yet draw a great many visitors. Pop. 13,786.

Acre (ā'ker), a standard measure of land, used in the United States and Great Britain and its colonies. The acre consists of 4840 square yards, divided into 4 roods. The old Scotch acre contains 6146.8 square yards, the old Irish acre 7840 square yards.

Acre, a disputed territory in South America, lying on the Aquiri River between Bolivia and Brazil, and of great value as one of the most important rubber-bearing districts. The claim of possession at times nearly led to war between the claimants, until settled by treaty in 1903.

Acre (ancient *Accho* and *Ptolemaïs*), a seaport of Syria, in Northern Palestine, on the Bay of Acre, early a place of great strength and importance. Taken from the Saracens under Saladin in 1191 by Richard I of England and Philip of France; bravely defended by the Turks assisted by Sir Sidney Smith in 1799 against Napoleon; in 1832, taken by Ibrahim Pasha; in 1840, bombarded by a British, Austrian, and Turkish fleet, and restored to Turkey. Taken by British forces 1917. Pop. 11,000.

Acri (ä'krē), a town of S. Italy, prov. of Cosenza. Pop. about 13,000.

Acrocephali (a-krō-sef'a-li), tribes of men distinguished by pyramidal or high skulls.

Acrocorinthus (a'krō-cō-rin'thus), a steep rock in Greece, nearly 1900 feet high, overhanging ancient Corinth, and on which stood the acropolis or citadel, the sacred fountain of Pirēnē being also here. This natural fortress has proved itself of importance in the modern history of Greece.

Ac'rogens (-jenz), lit. summit-growers, a term applied to the ferns, mosses, and lichens (cryptogams), as growing by extension upwards, in contradistinction to endogens and exogens.

Acrolein (ak'ro-līn), the acrid principle produced by the destructive distillation of fatty bodies arising from the decomposition of glycerine. It is a limpid liquid, boiling at 52.4°, its vapor being so irritating that a few drops in a room render the air insupportable. When mixed with a solution of potash or soda this irritating property disappears.

Ac'rolith, an early form of Greek statuary in which the head, hands, and feet only were of stone, the trunk of the figure being of wood draped or gilded.

Acrop'olis (Gr. *akros*, high, and *polis*, a city), the citadel or chief place of a Grecian city, usually on an eminence commanding the town. That of Athens contained some of the finest buildings in the world, such as the Parthenon, Erechtheum, etc.

Acrostic (a-kros'tik), a poem of which the first or last, or certain other letters of the line, taken in order, form some name, motto, or sentence. A poem of which both first and last letters are thus arranged is called a double acrostic. In Hebrew poetry, the term is given to a poem, of which the initial letters of the lines or stanzas, were made to run over the letters of the alphabet in their order, as in Psalm cxix.—Acrostics have been much used in complimentary verses, the initial letters giving the name of the person eulogized.

Act, in special senses: (1) In dramatic poetry, one of the principal divisions of a drama, in which a definite and coherent portion of the plot is represented; generally subdivided into smaller portions called *scenes*. The Greek dramas were not divided into acts. The dictum that a drama should consist of five acts was first formally laid down by Horace, and has been generally adhered to by modern dramatists in tragedy. In comedy no such distinction is observed.—(2) Something formally done by a legislative or judicial body; a statute or law passed.—(3) In universities, a thesis maintained in public by a candidate for a degree. See *Act of God, of Parliament, of Settlement*, etc.

Acta Diur'na (L., proceedings of the day), a daily Roman newspaper which appeared under both the republic and the empire.

Actæ'a. See *Baneberry.*

Actæon (ak-tē'un), in Greek mythology, a great hunter, turned into a stag by Artemis (Diana) for looking on her when she was bathing, and torn to pieces by his own dogs.

Acta Erudito'rum (L., acts of the learned), the first literary journal that appeared in Germany (1682–1782). Among the contributors, the most distinguished was Leibnitz.

Acta Sancto'rum (L., acts of the saints), a name applied to all collections of accounts of ancient martyrs and saints, both of the Greek and Roman Churches, more particularly to the valuable collection begun by John Bolland, a Jesuit of Antwerp in 1643, and which, being continued by other divines of the same order (*Bollandists*), now extends to sixty volumes, the lives following each other in the order of the calendar.

Actinia (ak-tin'i-a), the genus of animals to which the typical sea-anemones belong. See *Sea-anemone.*

Actinism (ak'tin-izm), the property of those rays of light which produce chemical changes, as in photography, in contradistinction to the light rays and heat rays. The actinic property or force begins among the green rays, is strongest in the violet rays, and extends a long way beyond the visible spectrum.

Actinium (ak-tin'i-um), the name given by Dr. T. P. Phipson in 1881 to a supposed metallic element discovered by him. The existence of this element is not now accepted by chemists, and the name of Actinium was given in 1900 to a radio-active substance discovered by A. Delverne in the decomposition of pitchblende. It gives off the same rays as radium, but its emanation dies away very rapidly. It appears to belong to the iron group of elements.

Actinolite (ak-tin'ō-līt), a mineral nearly allied to hornblende.

Actinograph (ak-tin'ō-graf), an instrument for measuring and recording the variations in the actinic force of the solar rays.

Actinometer (ak-ti-nom'e-tėr), an instrument for measuring the intensity of the sun's actinic rays. See *Actinism.*

Actinozoa (ak-tin-ō-zō'a), or ANTHOZOA, an order of Coelenterate animals, including such polyp-like forms as the corals (except millepores) and sea anemones.

Action (ak'shun), the mode of seeking redress at law for any wrong, injury, or deprivation. Actions are divided into civil and criminal, the former again being divided into real, personal, and mixed.

Actium (ak'shi-um, ak'ti-um), a promontory on the western coast of Northern Greece, not far from the entrance of the Ambracian Gulf (Gulf of Arta), now called La Punta, memorable on account of the naval victory gained here by Octavianus (afterwards the Emperor Augustus) over Antony and Cleopatra, September 2, B.C. 31, in sight of their armies, encamped on the opposite shores of the gulf. Soon after the beginning of the battle Cleopatra fled with sixty Egyptian ships, and Antony basely followed her, and fled with her to Egypt. The deserted fleet was not overcome without making a brave resistance. Antony's land forces soon went over to the enemy, and the Roman world fell to Octavianus.

Act of Congress, a law or statute passed by both houses of the United States Congress and acceded to by the President, or passed over his veto. If pronounced unconstitutional by a decision of the Supreme Court an Act of Congress ceases to be valid.

Act of God, a legal term defined as 'a direct, violent, sudden, and irresistible act of nature, which could not, by any reasonable cause, have been foreseen or resisted.' No one can be legally called upon to make good loss so arising.

Act of Parliament, a law or statute proceeding from the parliament of the United Kingdom, passed in both houses, and as-

sented to by the king. Acts are either public or private, the former affecting the whole community, the latter only special persons and private concerns. The whole body of public acts constitutes the *statute law.*

Act of Settlement, an act passed by the English parliament in 1701, by which the succession to the throne of the three kingdoms, in the event of King William and Queen Anne dying without issue, was settled on the Princess Sophia, electress of Hanover, granddaughter of James I, and her heirs, with the restriction that they should be Protestants. By this act George I, son of the Princess Sophia, succeeded to the crown on the death of Queen Anne, in 1714.

Act of Uniformity, an English act passed in 1662 enjoining upon all ministers to use the Book of Common Prayer on pain of forfeiture of their livings. See *Nonconformists.*

Acton (ak'tun), a kind of padded or quilted vest or tunic formerly worn under a coat of mail to save the body from bruises, or used by itself as a defensive garment. Jackets of leather or other material plated with mail were also so called. *Gambeson* was an equivalent term.

Quilted Acton of the fifteenth century.

Acton (ak'tun), a name of various places in England, one of them a western suburb of London, with a population of 57,523.

Actor (ak'tur), one who represents some part or character on the stage. Actresses were unknown to the Greeks and Romans in the earliest times, men or boys always performing the female parts. They appeared under the Roman empire, however. Charles II first encouraged the public appearance of actresses in England, though they appear to have been employed on the Continent of Europe much earlier. In Shakespeare's time female parts were performed by men and boys. See *Drama.*

Acts of the Apostles, one of the books of the New Testament, written in Greek by St. Luke, probably in A.D. 63 or 64. It embraces a period of about thirty years, beginning immediately after the resurrection, and extending to the second year of the imprisonment of St. Paul in Rome. Very little information is given regarding any of the apostles excepting St. Peter and St. Paul, and the accounts of them are far from being complete.

Actuary (ak'tū-a-ri), an accountant whose business is to make the necessary computations in regard to a basis for life assurance, annuities, reversions, etc.

Aculeus (a-kū'lē-us), in botany, a prickle, or sharp-pointed process of the epidermis, as distinguished from a thorn or spine, which is of a woody nature.

Acupressure (a-kū-presh'ur), a means of arresting bleeding from a cut artery, introduced by Sir James Simpson in 1859, and consisting in compressing the artery above the orifice, that is, on the side nearest the heart, with the middle of a needle (L. *acus*, a needle) introduced through the tissues.

Acupuncture (a-kū-pungk'tūr), a surgical operation, consisting in the insertion of needles into certain parts of the body for alleviating pain, or for the cure of different species of rheumatism, neuralgia, etc.

Ada, a city, county seat of Pontotoc county, Oklahoma, 73 miles S. E. of Oklahoma City. Seat of State Normal School. It has cement works, flour and cottonseed oil mills, etc. Pop. (1920) 8012.

Adagio (Italian; a-dä'jō), a musical term, expressing a slow time.

Adâl (a-däl'), a country in Africa, east of Abyssinia and west of the Gulf of Tajurrah, inhabited by a dark-brown race known as Afar or Danâkil, of nomadic habits, Mohammedans in religion.

Adalia (ad-ä-lī'a), a seaport on the south coast of Asia Minor. Pop. est. 26,000-30,000.

Adam (ä-däm), ADOLPHE CHARLES, a French composer, more especially of comic operas; born 1803; died 1856. Wrote *Le Postillon de Longjumeau* and *Le Brasseur de Preston* (Brewer of Preston).

Adam (ad'am), ALBRECHT, a German painter of battles and animals; born 1786; died 1862. Three sons of his have also distinguished themselves as painters, especially FRANZ, born 1815, among whose best pictures are several representing scenes of the Franco-German war; died 1886.

Adam, ALEXANDER, a Scottish classical scholar, born in 1741, became in 1768 rector of the High School of Edinburgh, and died there in 1809. Wrote *Principles of Latin and English Gram-*

mar; Roman Antiquities. a useful schoolbook; *Summary of Geography and History; Classical Biography,* etc.

Adam, ROBERT, an eminent Scottish architect, was born in 1728, and died in 1792. In conjunction with his brother James he was much employed by the English nobility and gentry in constructing modern and embellishing ancient mansions. His style, novel at the time, had the serious defect of excessive decoration.

Adam and Eve, the names given in Scripture to our first parents, an account of whom and their immediate descendants is given in the early chapters of Genesis. Cain, Abel, and Seth are all their sons that are mentioned by name; but we are told that they had other sons as well as daughters, and that Adam finally died at the age of 930 years. There are numerous Rabbinical additions to the Scripture narrative of an extravagant character, such as the myth of Adam having a wife before Eve, named *Lilith,* who became the mother of giants and evil spirits. Other legends or inventions are contained in the Koran.

Adam de la Halle, an early French writer and musician; born 1240; died 1287. His *Jeu de Robin et de Marion* may be regarded as the first comic opera ever written.

Adamant (ad'a-mant), an old name for the diamond; also used in a vague way to imply a substance of impenetrable hardness.

Adaman'tine Spar, a name of the mineral corundum or of a brownish variety of it.

Adamawa (ä-dä-maw'ä), a region of Central Africa, between lat. 6° and 11° N., and lon. 11° and 17° E.; also called *Fumbina.* Much of the surface is hilly or mountainous, Mount Atlantitka being 9,000 or 10,000 feet. The principal river is the Benue. A great part of the country is covered with thick forests. The inhabitants are industrious and intelligent. Cotton and ivory are the chief articles of trade. Chief town and capital Yola.

Adamites (ad'am-īts), a name of sects or religious bodies that have appeared at various times: so called because both men and women were said to appear naked in their assemblies, either to imitate Adam in the state of innocence or to prove the control which they possessed over their passions.

Adamnan (ad-am-nan'), ST., born in Ireland or Scotland about 624, was elected abbot of Iona in 679, and died there about 703 or 704. He is best known from his *Life of St. Columba.*

Adams (ad'amz), a village and township, Berkshire co., Massachusetts, 16 miles from Pittsfield. Graylock or Saddle Mountain (3535 feet), the highest point in the state, is in the township. It has manufactures of cotton, wool, iron, paper, etc. Pop. of township (1910) 13,026; (1920) 12,967.

Ad'ams, CHARLES FRANCIS, American littérateur and statesman, born in 1807, was a son of John Quincy Adams. His youthful years were spent in Europe, partly in England; but he finished his education at Harvard, and afterwards studied law. After serving some years in the Massachusetts legislature he was elected to Congress in 1858. In 1861 he was sent to England as American minister, and showed much tact and ability, under the difficult conditions arising from the Civil war. He edited a complete edition of the works of John Adams, his grandfather, with a biography He was one of the arbitrators on the Alabama claims. Died in 1886.

Adams, CHARLES FRANCIS, publicist and historian, born in Boston, Mass., May 27, 1835; died March 19, 1915. He graduated at Harvard in 1856, was admitted to the bar in 1858, in 1861 entered the Union Army, and at the close of the war was in command of a regiment of colored cavalry. After the year 1874 he devoted much time to the study of American history, and in 1913 lectured at Oxford University. His works include *Railroads—Their Origin and Problems, Richard Henry Dana, Massachusetts—Its Historians and Its History, Life of Charles Francis Adams* and *Lee at Appomattox and Other Papers.*

Adams, CHARLES KENDALL, instructor and author, born Derby, Vermont, in 1835; graduated at the University of Michigan in 1861, when he became in 1863 assistant professor and in 1868 full professor of history. Was professor of history at Cornell College in 1881–85 and president 1885–92; then president of University of Wisconsin. Author of *Democracy and Monarchy in France;* editor-in-chief of revised edition of Johnson's *Universal Cyclopedia.* Died in 1902.

Adams, JOHN, second president of the United States, was born at Braintree (now Quincy), Massachusetts, October 30, 1735. He was educated at Harvard University, and adopted the law as a profession. His attention was directed to politics by the question as to the right of the English parliament to tax the colonies, and in 1765 he published some essays strongly opposed to the claims of the mother country. As a member of the new American Congress in

1774, 1775, and 1776 he was strenuous in his opposition to the home government, and in organizing the various departments of the colonial government. On 13th May, 1776, he seconded the motion for a declaration of independence proposed by Lee of Virginia, and was appointed a member of committee to draw it up. The Declaration was actually drawn up by Jefferson, but it was Adams who handled it in Congress. In 1778 he went to France on a special mission, and spent in all nine years abroad as representative of his country in France, Holland, and England. After taking part in the peace negotiations, he was appointed, in 1785, the first ambassador of the United States to the court of St. James. He was recalled in 1788, and in the same year elected vice-president of the republic under Washington. In 1792 he was re-elected vice-president, and at the following election in 1796 was chosen president in succession to Washington. His term of office proved a stormy one, and in 1800 he was defeated by the Republican candidate, Thomas Jefferson. He died 4th July, 1826.

Adams, JOHN (1772-1863), an American teacher, born in Connecticut; principal of Phillips Academy, Andover, Mass., 1810-33. He is commemorated in O. W. Holmes' 'The Schoolboy.'

Adams, JOHN (1760-1829), the assumed name of Alexander Smith, a mutineer of the *Bounty*, and governor of Pitcairn Island (q. v.).

Adams, JOHN (1825-64), a Confederate general in the Civil War; killed at the battle of Franklin, Tenn.

Adams, JOHN COUCH (1819-92), an English astronomer, born in Cornwall. He shares with Leverrier, of Paris; and Galle, of Berlin, the discovery of the planet Neptune, 1846.

Adams, JOHN QUINCY, sixth president of the United States, son of John Adams, second president, was born at Quincy, Mass., July 11, 1767; died February 23, 1848. Graduating from Harvard in 1787, he became a lawyer. In 1794 Washington appointed him minister to The Hague; afterwards was sent to Portugal, 1796; and by his father to Berlin, 1797. In 1803 he became United States senator from Massachusetts, but resigned because his support of the embargo brought harsh criticism from New England. From 1806 to 1809 he was professor of rhetoric at Harvard. In 1809 Madison appointed him minister to Russia, and he was one of the negotiators of the treaty of Ghent in 1814. His next diplomatic post was minister to England, 1815, which rounded out a unique diplomatic career. Monroe appointed him secretary of state in 1817, and it was while he held office that the famous Monroe Doctrine (q. v.) was announced, credited by some to Adams. In 1825 he became president. There was no choice in the Electoral College in 1824, the vote being: Jackson, 99; Adams, 84; Crawford, 41; Clay, 37; and the election was thrown into the House of Representatives, which chose Adams for president. Although a very able, honest, and intensely patriotic man, of wide experience in governmental affairs, Adams was nevertheless too cold and distant in manner and lacked the power to arouse enthusiasm. In the election of 1828 Andrew Jackson (elected) received 178 votes, and Adams 83.

Adams, JULIUS WALKER (1812-99), an American civil engineer, born at Boston, Mass.; noted as the pioneer engineer of the first Brooklyn bridge.

Adams, MAUDE KISKADDEN, an American actress, born at Salt Lake City, November 11, 1872. She made her first great success in Barrie's 'Little Minister,' 1898. Other plays in which she starred with growing popularity were Rostand's 'L'Aiglon,' Barrie's 'Peter Pan,' Rostand's 'Chantecler,' and Shakespearean plays.

Adams, NEHEMIAH (1806-78), an American Congregational clergyman, born at Salem, Mass., graduated at Harvard University and Andover Theological Seminary. He was pastor of the Essex Street Church, Boston, 1834-70. His eloquence gained him the title of 'the Addison of the American pulpit.'

Adams, SAMUEL, an American patriot and statesman, born at Boston, Mass., September 27, 1722; died October 2, 1803. He was one of the signers of the Declaration of Independence, which he labored indefatigably to bring forward. He was lieutenant-governor of Massachusetts, 1789-94, and governor of Massachusetts, 1794-97.

Adams, SAMUEL HOPKINS, an American author, born at Dunkirk, N. Y., in 1871; author of *The Great American Fraud*, *Common Sense*, *Success*, etc.

Adam's Apple, the lump or enlargement in the front of the throat, most noticeable in males; caused by the thyroid cartilages.

Adam's Bridge, a chain of reefs, sandbanks, and islands stretching between India and Ceylon: so called because the Mohammedans believe that when Adam was

driven from paradise he had to pass by this way to Ceylon (where is also Adam's Peak).

Adam's Needle, a popular name of the Yucca plant.

Adam's Peak, one of the highest mountains in Ceylon, 45 m. east-southeast of Colombo, conical, isolated, and 7,420 feet high. On the top, a rocky area of 64 feet by 45, is a hollow in the rock 5 feet long bearing a rude resemblance to a human foot, which the Brahmans believe to be the footprint of Siva, the Buddhists that of Buddha, the Mohammedans that of Adam. Devotees of all creeds here meet and present their offerings (chiefly rhododendron flowers) to the sacred footprint. The ascent is very steep, and towards the summit is assisted by steps cut and iron chains riveted in the rock.

Adamson Law. A bill which provided that after Jan. 1, 1917, eight hours should be regarded as a basis of reckoning for a day's pay of men engaged in the operation of railroad trains in interstate commerce (excepting roads less than 100 miles long and electric lines), that they should receive pro rata pay for work in excess of eight hours, and that their rate of compensation should not be changed pending an investigation for from six to nine months of the effect of the eight-hour day upon the railroads by a commission to be appointed by the President.

Adana (äd'ä-nä), an ancient town of southeastern Asia Minor, on the Sihun, which is here navigable, 30 m. from the Mediterranean, well built, and with considerable trade. Pop. estimated at about 50,000, largely Armenians. Many were massacred in 1909 by Mohammedans during the revolutionary movement in Turkey.

Adanso'nia. See *Baobab.*

Adar (ā'dar), the twelfth month of the Hebrew sacred and sixth of the civil year, answering to part of February and part of March.

Adda (äd'dä, ancient *Addua*), a river of North Italy, which, descending from the Rhætian Alps, falls into Lake Como, and leaving this joins the Po, after a course of about 170 miles.

Adda, a species of lizard, more commonly called skink.

Ad'dams, JANE, social reformer; born Cedarville, Illinois, in 1860; opened in 1889 the social settlement of Hull House, Chicago; has done admirable work in uplifting the poor and ignorant of that city; has lectured on social and political reform. Author of *Democracy and Social Ethics, etc.*

Addax, a species of African antelope (*Addax nasomaculātus*), of the size of a large ass, which it resembles. The horns of the male are about 4 feet long, beautifully twisted into a wide-sweeping spiral of two turns and a half, with the points directed outwards. It has tufts of hair on the forehead and throat, and large, broad hoofs. It inhabits the sandy regions of Nubia and Kordofan, and is also found in Caffraria.

Head of Addax (*Addax nasomaculātus*).

Adder (ad'der), a name often applied to the common viper as well as to other kinds of venomous serpents. See *Viper.*

Adder-pike (*Trachīnus vipĕra*), a small species of the weever fish, called also the Lesser Weever or Sting-fish. See *Weever.*

Adder-stone, the name given in different parts of Britain to certain rounded perforated stones or glass beads found occasionally, and supposed to have a kind of supernatural efficacy in curing the bites of adders. They are believed to have been anciently used as spindle-whorls, that is, a kind of small fly-wheels to keep up the rotatory motion of the spindle.

Adder's-tongue, a species of common fern (*Ophioglossum vulgātum*) whose spores are produced on a spike, supposed to resemble a serpent's tongue.

Adder's-wort, a name of snakeweed or bistort (*Polygŏnum bistorta*), from its supposed virtue in curing the bite of serpents.

Ad'dington, HENRY, Viscount Sidmouth, born in 1755, died 1844. Entered parliament, 1783, as a warm supporter of Pitt. Was elected speaker of the House of Commons, 1789, and in 1801 invited by the king to form an administration, chiefly signalized by the conclusion of the Peace of Amiens. Quarrelled with Pitt, whom he bitterly attacked. Was home secretary from 1812 till 1822, his repressive policy making him remarkably unpopular with the nation at large. Retired from official life in 1824.

Ad'dison, JOSEPH, an eminent English essayist, son of the Rev. Lancelot Addison, afterwards dean of Lichfield, born at Milston, Wiltshire, 1st May, 1672; died 17th June, 1719. He was educated at the Charterhouse, where he became acquainted with Steele, and afterwards at Oxford. He held a fellowship from 1697 till 1711, and gained much praise for his Latin poetry and other contributions to classical literature. He secured as his earliest patron the poet Dryden, who inserted some of his verses in his *Miscellanies* in 1693. A translation of the fourth *Georgic* appeared in the same collection in 1694, and he subsequently translated for it two and a half books of *Ovid.* Dryden also prefixed Addison's prose essay on Virgil's *Georgics* to his own translation of that poem, which appeared in 1697. An early patron of his was Charles Montague, afterwards Earl of Halifax; another was Lord Somers, who procured him a pension of £300 a year to enable him to qualify for diplomatic employments by foreign travels. He spent from the autumn of 1699 to that of 1703 on the Continent, where he became acquainted with Malebranche, Boileau, etc. During his residence abroad his tragedy of *Cato* is supposed to have been written. During his journey across Mount Cenis he wrote his *Letter from Italy,* esteemed the best of his poems, and in Germany his *Dialogues on Medals,* which was not published till after his death. His *Remarks on Several Parts of Italy in the Years 1701-3* was published in 1705. His political friends lost power on the death of William III, but *The Campaign,* a poem on the battle of Blenheim, procured him an appointment as a commissioner of appeal on excise. In 1706 he received an undersecretaryship, in 1707 accompanied Halifax on a mission to Hanover, in 1709 became secretary to the viceroy of Ireland, and keeper of the records. In 1708 he was elected M. P. for Lostwithiel, a seat he exchanged in 1710 for Malmesbury, which place he continued to represent till his death. From October, 1709, to January, 1711, he contributed 75 papers to the *Tatler,* either wholly by himself, or in conjunction with Steele, thus founding the new literary school of the Essayists. For the *Spectator* (2d January, 1711, to 6th December, 1712) he wrote 274 papers, all signed by one of the four letters C, L., I., O. He contributed also to other periodicals; his tragedy of *Cato,* produced April, 1713, ran for twenty nights, and was translated into French, Italian, German, and Latin. On the death of Queen Anne he successively became secretary to the lords justices, secretary to the Irish viceroy, and one of the lords commissioners of trade. In August, 1716, he married the Countess of Warwick, which marriage is said to have been uncomfortable. He retired from public life, March, 1718, with a pension of £1500 a year. He formed a close friendship with Swift, and was chief of a distinguished literary circle. He had literary quarrels with Pope and Gay, the former of whom in revenge wrote the satire contained in his lines on Atticus in the epistle to Arbuthnot. He also had a paltry quarrel over politics with his ancient comrade Steele. His death took place at Holland House, its cause being dropsy and asthma. He was buried in Westminster Abbey. Of his style as a writer so much has been said that nothing remains to say but to quote the dictum of Johnson, 'Whoever wishes to attain an English style, familiar but not coarse, and elegant but not ostentatious, must give his days and nights to the volumes of Addison.'

Addison's Disease (from Dr. Thomas Addison, Guy's Hospital, London, who traced the disease to its source), a fatal disease, the seat of which is the two glandular bodies placed one at the front of the upper part of each kidney, and called *suprarenal capsules.* It is characterized by anæmia or bloodlessness, extreme prostration, and a brownish or olive-green color of the skin. Death usually results from weakness, and commonly within a year.

Address (ad-dres'), FORMS OF. The following are the principal modes of formally addressing titled personages or persons holding official rank.

AMBASSADOR.—The title 'Excellency' belongs specially to ambassadors and to United States ministers to a foreign court. Address letters 'His Excellency' (with name or distinctive title following). Begin, 'Sir,' 'My Lord,' according as the ambassador possesses title or not. When personal reference is made, say 'Your Excellency.' An envoy extraordinary or chargé d'affaires, though inferior to an ambassador strictly so called, also, usually receives the title 'Excellency'; and the wives of ambassadors are generally addressed similarly during their husbands' tenure of office and while residing abroad.

ARCHBISHOP.—Address: 'The most Reverend A— B—, D.D.' The wife of an archbishop has no special title.

BISHOP.—Address: 'The Right Rev. Bishop,' or 'The Rt. Rev. A— B—. D.D.' A bishop's wife and family have no special title.

CARDINAL.—The special title of a car-

dinal as such is 'His Eminence.' Begin: 'Your Eminence.'

CLERGYMAN.—The general form of address is 'The Reverend A—B.' Begin: 'Rev. Sir,' or simply 'Sir.'

CONGRESS, MEMBERS OF.—Are addressed generally 'The Honorable A—B—.'

CONSUL.—There is no special form of address to a person as such, though in this country a consul is called 'Honorable.'

DOCTOR.—The initials denoting the particular degree are placed after the usual form of address, whether D.D., LLD., M.D., D.Sc., etc., 'The Rev. A.—, B.—, D.D.,' 'A—B, Esq., M.D.' Less formally: 'The Rev. Doctor B.—,' 'Doctor A—B.'

DUKE.—Address: 'His Grace the Duke of—.' Begin: 'My Lord Duke'; refer to as 'Your Grace.' All the children of a duke are entitled to be called 'Right Honorable.'

GOVERNORS OF STATES.—Are usually addressed as 'His Excellency.' 'His Excellency A—B—, Governor of —,' or, 'His Excellency the Governor of—.' A lieutenant-governor is called 'Honorable.'

JUDGE.—'His Honor, Judge —' (surname); on the bench referred to as 'Your Honor.'

KING.—Should be addressed as 'The King's Most Excellent Majesty.' Begin: 'Sire,' or 'May it please Your Majesty'; refer to as 'Your Majesty.'

LAWYERS.—Address: 'A—B—, Esq., or 'Mr. A—B—.' 'Esquire' is a complimentary title given to any gentleman of position not possessing another title.

MARRIED LADY.—Has the title Mrs. prefixed to her name in speaking and writing. On being approached in writing or speech by strangers or inferiors, should be addressed as 'Madam,' or 'Dear Madam.' An unmarried lady is addressed as 'Madam,' in speaking or writing, except where her name, 'Miss—,' is used. Two or more unmarried ladies are addressed as 'The Misses A—B—,' while 'Mesdames' is plural for 'Madam.'

MAYOR.—Address: 'The Honorable Mayor of —.' Address: 'Sir,' or 'Dear Sir.' Mayors are usually styled 'Honorable'; as 'The Honorable A—B, Mayor of —.

MEMBER OF HOUSE OF REPRESENTATIVES.—Address: 'Honorable A—B—, M.C.' Begin: 'Sir,' or 'Dear Sir.' A Congressman's wife and family have no title of recognition.

MEMBER OF PARLIAMENT.—Not specially recognized except by adding 'M.P.' to ordinary address: 'A—B—, Esq., M.P.,' 'Sir A—B—, Bart. M.P.'

OFFICERS, MILITARY AND NAVAL.—Their professional rank is put before any title they may independently possess: 'General' or 'Admiral the Right Hon. the Earl of—'; 'Colonel A—B—.'

PRESIDENT (U. S.).—Address: 'His Excellency the President of the United States,' 'His Excellency A— B—, President of the United States.' The Vice-President and ex-presidents are 'Honorable'; 'The Honorable the Vice-President'; 'The Honorable A—B.'

PRINCE.—Address: 'His Royal Highness the Prince of Wales'; 'His Royal Highness Prince A—' (Christian name). Begin in any case: 'Sir'; refer to as 'Your Royal Highness.'

PRINCESS.—Address: 'Her Royal Highness the Princess of Wales'; 'Her Royal Highness the Princess A—' (Christian name); Begin: 'Madam'; refer to as 'Your Royal Highness.'

PROFESSOR.—A form of address for a public teacher in a university, especially one to whom the title has been formally granted; but should not be employed indiscriminately to any teacher or schoolmaster.

QUEEN.—Address: 'The Queen's Most Excellent Majesty.' Begin 'Madam,' or 'May it please Your Majesty'; refer to as 'Your Majesty.'

Ade, GEORGE, an American author, born at Kurtland, Ind., in 1866. He engaged in newspaper work and wrote humorous sketches; also various plays including *The County Chairman*, *The Sultan of Sulu*, *The College Widow*, etc.

Adel'. See *Adâl.*

Adelaide (ad'e-lād), the capital of South Australia, 6 miles east from Port Adelaide (on St. Vincent Gulf), its port, with which it is united by railway, founded in 1836, and named after the queen of William IV. Situated on a large plain, it is built nearly in the form of a square, with the streets at right angles, and is divided into North and South Adelaide, separated by the river Torrens, which is crossed by several bridges, and by means of a dam is converted into a fine sheet of water. The public buildings comprise the Government House, the town hall, the post and telegraph offices, the government offices, courthouses, the houses of legislature, the university, South Australian Institute, etc. There is a complete service of electric cars. Adelaide is connected by railway with Melbourne, and is the terminus of the overland telegraph to Port Darwin. It has a large trade. Pop. (including suburbs). 235,751.

Adelard of Bath, an English philosophical writer of the twelfth century. He traveled through Spain, north of Africa, Greece and Asia Minor, and acquired much knowledge from the Arabs, which he put in systematic shape. Chief works, *Perdifficiles Quæstiones Naturales* and *De Eodem et Diverso.*

Adelphi College, an American non-sectarian collegiate institution at Brooklyn, N. Y., incorporated in 1896. It has a college for women, a normal department, and art and other departments. In 1920-21 there were 533 students.

Adelsberg (ä'delz-berg), a town of Carniola, formerly part of Austria-Hungary, now included in the Serb-Croat-Slovene State (Jugo-Slavia). It lies midway between Trieste and Laibach and is remarkable for the wonderful stalactite cave in its vicinity. Population about 4000.

Adelung (åd'e-lung), JOHANN CHRISTOPH, a German philologist; born 1732; died 1806. He is best known for his compilation of a great German dictionary, *Grammatiseh-kritisches Wörterbueh der hochdeutschen Mundart* (Leipzig, 1774-86), and his *Mithridates,* a work on general philology. In 1787 he was appointed librarian of the public library in Dresden—an office which he held till his death.—FREDERICK VON ADELUNG, nephew of the above, also distinguished himself as a philologist. Was tutor to the Grand Duke Nicholas, afterwards Emporor of Russia, and became president of the Academy of Sciences at St. Petersburg (Petrograd). Born in 1768; died in 1843.

Ademption (a-demp'shun; Lat. *adimere,* to take away), the revocation of a legacy, in whole or in part, in some other way than by a testamentary instrument, as when a testator during his lifetime gives to his legatee the legacy or portion of the legacy which he had purposed to give him at his death by his will. Legacies are adeemed by lack of sufficient assets or by loss or destruction.

Aden (ā'den), a seaport town and territory belonging to Britain, on the southwest coast of Arabia, in a dry and barren district, the land side being almost entirely closed in by an amphitheater of rocks, and possessing an admirable harbor. Occupying an important military position, Aden is strongly fortified and permanently garrisoned. It is of importance also as a coaling station for steamers, and carries on a large commerce in Arabian coffee, textiles, hides, petroleum, etc. The peninsula on which it stands somewhat resembles the rock of Gibraltar, and has been rendered as formidable. Aden was a Roman colony, and in the middle ages it was a great entrepôt of the Eastern trade. It was acquired by Britain in 1839, after which it was attacked repeatedly by the Arabs. The total area of the settlement, including the island of Perim, is 80 sq. miles. Pop. (including Perim), 46,165. The Kuria Muria islands, five in number, off the coast of Arabia, are attached to Aden. They were ceded by the Sultan of Muskat for the purpose of landing the Red Sea cable.

Adenanthera (ad-en-an'the-ra), a genus of trees and shrubs, natives of the East Indies and Ceylon, nat. order Leguminosæ. *A. pavonia* is one of the largest and handsomest trees of India, and yields hard, solid timber called red sandalwood. The bright-scarlet seeds, from their equality in weight (each = 4 grains), are used by goldsmiths in the East as weights.

Adenitis (ad-en-ī'tis; Gr. *aden,* a gland), in medicine, inflammation of a gland, generally of the lymphatic glands. The commonest forms are the syphilitic and the tuberculous.

Adenoids (ad'en-oidz), is a term applied to enlargements of the so-called pharyngeal, or Luschka's tonsil, which, however, is not, strictly speaking, a tonsil, but rather a collection of small lymph glands in the upper part of the posterior wall of the naso-pharynx. There are many of these small glands and when inflamed by any of the causes mentioned below they enlarge rapidly. Adenoids always exist when the tonsils are enlarged. By pressing on the nasal orifice of the eustachian tube, an osteo-membranous canal of small lumen connecting the middle part of the ear with the pharynx, they cause a more or less chronic inflammation called eustachian catarrh, which may extend through the tube to the middle part of the ear, producing a stuffy feeling in the ear, of which the child usually complains that it 'hurts'; deafness; suppuration or abscess or 'running ear,' and more or less permanent impairment of hearing. The adenoids interfere with the passage of air through the nose and naso-pharynx, being in some instances sufficiently large to entirely occlude the nasal passageway, compelling the child to breathe through his mouth, which makes the mouth and larynx dry, and is one cause of cough. The enlargement of the tonsils, which accompanies it, produces constant cough in some children. The mouth breathing produces a characteristic

facial expression, showing parted, thickened lips, prominent eyeballs, obliteration of the normal lines of expression, and a consequent appearance of listlessness and mental inferiority. Noisy respiration, snoring, diminished or absent vocal resonance; thickness of speech, with a nasal twang; absent-mindedness, apparent inattention (which may be due to mental dullness or impaired hearing or both, consequent upon the adenoids), inability to fix the attention, and defective memory are conditions presented by the child. These children are very backward in school, and the condition is frequently attributed to other than the real cause. The letters *m*, *n* and *ng* sometimes cannot be pronounced. The presence of the glands thus enlarged keeps up a continuous irritation in the mucous membrane in the nose and throat, leading to a chronic catarrh, with the persistent discharge of a thick, yellowish secretion through the nose and downwards into the throat. This condition is almost impossible to cure while the adenoids remain, and is another cause of cough. If the condition has existed for some time, a narrow, pinched appearance of the nose results, and a narrowing of the upper jaw, together with a high arching of the roof of the mouth, thus reducing the breathing space within the nose. The chest assumes a characteristic appearance, known as pigeon-breast. Bed-wetting is frequently found in connection with this condition. The tendency to the disease rapidly diminishes after the fifteenth year, and it is virtually absent from the adult. Adenoids are caused by repeatedly catching cold, long-continued cold in nose or throat, scarlet fever, measles, diphtheria and whooping cough. Heredity is a predisposing factor of variable consequence. The disease is becoming constantly more prevalent among children. The adenoid enlargement is always a condition concomitant with hypertrophied tonsils, both gland tissues being components of the general glandular system of the human body. The superficial position of these glands, being covered by mucous membrane only, subjects them to attacks of infectious bacteria, which so frequently gain entrance to the mouth. In fact, a great many varieties of bacteria can be found in the mouths of human beings at all times, ready to start up disease should a congestion occur, which would permit them to enter the tissues. It is in this manner that a cold starts up an infectious disease, of which this and tonsillitis are examples. The *Micrococcus catarrhalis* is one of the known causes of inflammations that lead to hypertrophy of the pharyngeal and tonsillar glands. It is treated by surgical removal (under general anesthesia), which, when thoroughly done, usually prevents subsequent recurrence, though occasionally it may recur in slight form if some small glands remain after the excision. Stuttering and stammering are sometimes cured by the removal of the adenoids and hypertrophied tonsils, together with the direct results above given, and the child promptly assumes his normal standing in his school studies.

Aderno (ä-der-nō′), a city of Sicily, 20 miles N. W. of Catania and about 10 miles W. S. W. of Mount Ætna. It is 1900 feet above the level of the sea. Anciently called *Hadranum*, it has fragments of the temple of Hadranus, also a Norman castle, etc. Pop. 31,000.

Adersbach Rocks (ä′derz-ba*h*), a remarkable group of isolated columnar rocks on the frontiers of Bohemia and Silesia, occupying several square miles of territory.

Adhesion (ad-hē′zhun), the tendency of two bodies to stick together when put in close contact, or the mutual attraction of their surfaces; distinguished from *cohesion*, which denotes the mutual attraction between the particles of a homogeneous body. Adhesion may exist between two solids, between a solid and a fluid, or between two fluids.

Adiantum, a genus of ferns; the maidenhair fern (q. v.).

Adige (ä′dē-jā), German ETSCH (ancient *Athĕsis*), a river of Northern Italy, which rises in the Rhætian Alps, and after a south and east course of about 180 miles, during which it passes Verona and Legnago, falls into the Adriatic, forming a delta connected with that of the Po. In November, 1917, during the European war, the Austrians drove the Italians back as far as the Piave. The floodgates of the river were thrown open and the country inundated near the coast, with great loss to the enemy. Here the Italians made a heroic stand, and the invaders were eventually driven back.

Adipocere (ad′i-pō-sēr), (L. *adeps*, fat, and *cera*, wax), a substance of a light-brown color formed by animal matter when protected from atmospheric air, and under certain circumstances of temperature and humidity.

Adipose Tissue (ăd′ĭ-pōs), the cellular tissue containing the oily or fatty matter of the body. It underlies the skin, surrounds the large vessels and nerves, invests the kidneys, etc., and sometimes accumulates in large masses.

Adirondack Mountains, a large mountain group belonging to the Appalachian

chain extending from the N. E. corner of the State of New York to near its centre. The scenery is wild and grand, diversified by numerous beautiful lakes, and the whole region is a favorite resort of sportsmen and tourists. Mount Marcy (5344 ft.) is the highest peak. A State forest reserve, intended to protect the upper waters of the Hudson, occupies the greater part of the region.

Ad'it, a more or less horizontal opening giving access to the shaft of a mine. It is made to slope gradually from the farthest point in the interior to the mouth, and by means of it the principal drainage is usually carried on. See *Mine.*

Adjective (ad'jek-tiv), in grammar, a word used to denote some quality in the noun or substantive to which it is accessory. The adjective is indeclinable in English (but has *degrees* of comparison), and generally precedes the noun, while in most other European languages it follows the inflections of the substantive, and is more commonly placed after it, though in German it precedes it, as in English.

Adjudication (ad-jū-di-kā'shun in general, the decision of a court of law; in bankruptcy proceedings, the final judgment.

Adjustment (ad-just'ment), in marine insurance, is the settling of the amount of the loss which the insurer is entitled under a particular policy to recover, and, if the policy is subscribed by more than one underwriter, of the amounts which the underwriters respectively are liable to pay.

Adjutant (ad'jū-tant), an officer appointed to each regiment or battalion, whose duty is to assist the commander. He is charged with instruction in drill, and all the interior discipline, duties, and efficiency of the corps. He has the charge of all documents and correspondence, and is the channel of communication for all orders.

Adjutant bird, *Leptoptĭlus argăla,* a large grallatorial or wading bird of the stork family, native of the warmer parts of India, where it is known as Hurglia Argala. It stands about five feet high, has an enormous bill, nearly bare head and neck, and a pouch hanging from the under part of the neck. It is one of the most voracious carnivorous birds known, and in India, from its devouring all sorts of carrion and noxious animals, is protected by law. From underneath the wings are obtained those light, downy feathers known as *marabou* feathers, from the name of an allied species of bird (*L. marabou*) inhabiting Western Africa, and also producing them.

Adjutant bird (*Leptoptĭlus argăla*).

Adjutant-general, is the chief staff officer of an army charged with the execution of all orders relating to the recruitment, equipment, and efficiency of the troops, and who distributes to them the orders of the day. —Among the Jesuits this name was given to a select number of fathers, who resided with the general of the order, and had each a province or country assigned to him.

Ad'ler, Felix, ethical reformer; born of Jewish descent in Germany in 1851; graduated at Columbia College, New York. He was professor of oriental languages and literature at Cornell University 1874-76, when he organized in New York the Ethical Society, an organization of free religionists, which has spread to other cities. He is still a lecturer in this society; has published *Creed and Deed* and other works.

Ad Libitum (lib'i-tum), a musical term signifying that the part so marked may be played according to the taste of the performer and not necessary in strict written time; also that an instrument in instrumental scores may be either played or left out.

Admetus (ad-mē'tus), in Greek mythology, King of Pheræ, in Thessaly, and husband of Alcestis, who gave signal proof of her attachment by consenting to die in order to prolong her husband's life. See *Alcestis.*

Administration (ad-min-is-trā'shun), in law, the management of the estate of intestate person, or of testator having no fit executor.

Administrator, in law, the person to whom the goods of

a man dying intestate are committed by the proper authority, and who is bound to account when required.

Admiral (ad′mi-ral), the commander-in-chief of a squadron or fleet of ships of war, or of the entire naval force of a country, or simply a naval officer of the highest rank. In the British navy admirals are of four ranks —admiral of the fleet, admiral, vice-admiral, and rear-admiral.—The title *admiral of the fleet* is conferred on a few admirals, and carries an increase of pay along with it. A *vice-admiral* is next in rank and command to an admiral; he carries his flag at the foretopgallantmast head, while an admiral carries his at the main. A *rear-admiral*, next in rank to the vice-admiral, carries his flag at the mizzentopgallantmast head.—*Lord high admiral*, in Great Britain, an officer who (when this rare dignity is conferred) is at the head of the naval administration of Great Britain. The rank of admiral was not known in the United States navy until 1862, when the office of rear-admiral was created and conferred first upon Farragut, for his services at New Orleans; vice-admiral was created for him in 1864, and admiral in 1866. The offices of admiral and vice-admiral were subsequently borne by David D. Porter, but discontinued after the death of the latter in 1891, until 1899, when the former was re-created for Dewey for his services in the harbor of Manila. In 1917 the U. S. navy list of flag officers included, besides the admiral of the navy, 21 active rear-admirals, three of whom were entitled to hold the rank of admiral while serving as commander-in-chief; one served as second in command, Atlantic fleet, and held the rank of vice-admiral while so serving; one held the rank of admiral while serving as chief of naval operations. There were 144 rear-admirals on the retired list.

Admiralty, that department of the government of a country that is at the head of its naval service. In Britain the lords commissioners of the admiralty were formerly seven, but are now five in number, with the addition of a civil lord, at the head being the *first lord*, and four others being *naval lords*.

Admiralty Court, a court which takes cognizance of civil and criminal causes of a maritime nature, including captures in war made, and offenses committed, on the high seas, and has to do with many matters connected with maritime affairs. In England the admiralty court was once held before the lord high admiral, and at a later period was presided over by his deputy or the deputy of the lords commissioners. In the United States admiralty cases are taken up in the first instance by the District Court, from which they may be removed in certain cases to the Circuit and ultimately to the Supreme Court.

Admiralty Island, an island belonging to the United States off the northwest coast of North America, 80 or 90 miles long and about 20 broad, covered with fine timber and inhabited by Sitka Indians.

Admiralty Islands, a cluster of islands, north of New Guinea, in Bismarck Archipelago, belonging to Germany previous to the European war. The largest is about 60 miles in length, the rest are much smaller. They are covered with a luxuriant vegetation and possess dense groves of cocoanut trees. The islands were assigned to Australia in 1919 and are now included in the British Empire. Pop. 4000.

Adnate (ad′nāt), in botany, applied to a part growing attached to another and principal part by its whole length, as stipules adnated to the leaf-stalk.

Adobe (ȧ-dō′bā), the Spanish name for a brick made of loamy earth, containing about two-thirds fine sand and one-third clayey dust, sun-dried; in common use for building in Mexico and Texas.

Adolescence (ad-ō-les′ens), the term now commonly adopted for the period between childhood and maturity, during which the characteristics—mental, physical and moral—that are to make or mar the individual are disclosed.

Adolphus of Nassau, was elected King of Germany, 1292. In 1298 the college of electors transferred the crown to Albert of Austria, but Adolphus refusing to abdicate a war ensued, in which he fell, after a heroic resistance, July 2, 1298.

Adonai (ad′o-nī), a name of God among the Jews. See *Jehovah*.

Adoni (ä-do′nē), a town of Madras presidency, British India, population 30,416. Well known for excellent silk and cotton fabrics.

Adonis (a-dō′nis), a mythological personage, originally a deity of the Phœnicians, but borrowed into Greek mythology. He was represented as being a great favorite of Aphroditē (Venus), who accompanied him when engaged in hunting, of which he was very fond. He received a mortal wound from the tusk of a wild boar, and when the goddess hurried to his assistance she found him lifeless, whereupon she caused his blood to give rise to the anemone. The worship

of Adonis, which arose in Phœnicia, latterly was widely spread round the Mediterranean. The name Adonis is akin to the Hebrew *Adonai*, Lord. See *Jehovah*.

Adonis, the modern Nahr-Ibrahim, a small river in Syria, rising in the Lebanon and flowing to the Mediterranean. It is connected with the legend of Adonis.

Adonis, a genus of ranunculaceous plants. In the corn-adonis or pheasant's eye (*A. autumnālis*) the petals are bright scarlet like the blood of Adonis, from which the plant is fabled to have sprung.

Adoptiani (a-dop-shi-a′ni), a religious sect which asserted that Christ, as to his divine nature, was properly the Son of God; but as to his human nature, only such by adoption. Elipandus, archbishop of Toledo, and Felix, bishop of Urgel, in Spain, avowed this doctrine in 783, and made proselytes both in Spain and France. The heresy was condemned by several synods.

Adoption (a-dop′shun), the admission of a stranger by birth to the privileges of a child. Among the ancient Greeks and Romans, and also some modern nations, adoption is placed under legal regulation. In Rome the effect of adoption was to create the legal relation of father and son, just as if the person adopted were born of the blood of the adopter in lawful marriage. The adopted son took the name of his adopter, and was bound to perform his new father's religious duties.

Adour (å-dör), a river of France, rising in the Pyrenees, and falling into the sea a little below Bayonne; length about 200 miles.

Adra (ä′drä), a seaport of Southern Spain, in Andalusia, near the mouth of the Adra, on the Mediterranean; with marble quarries and lead works. Pop. 11,188.

Adramyti (ä-drä-mē′tē) (ancient *Adramyttium;* the Turkish *Edremid*), a town of Turkey in Asia, near the head of the gulf of the same name, 80 miles north of Smyrna. Pop. about 5000.

Adrar, or Aderar (ä-dė-rar′), a district in the Western Sahara peopled by Berbers possessing camels, sheep and oxen, and cultivating dates, wheat, barley and melons. Chief towns, Wadan and Shinghit. It has inexhaustible beds of rock-salt.

Adrenal (ad-rē′nal), the term applied in anatomy to a pair of small glandular or follicular but ductless bodies, of unknown function, capping the kidneys in mammals and most other vertebrates. They are also called suprarenal or atrabiliary capsules.

Adrenalin (ad-ren′a-lin), the active principle of the adrenal glands, first isolated by a Japanese chemist, Takamine. Its probable formula is C_{10} H_{13} NO_3-½ H_2O. It increases blood pressure and constricts the vessels, and is employed to arrest hemorrhage, etc.

Adria (ä′dri-å), a cathedral city of Northern Italy, province of Rovigo, between the Po and the Adige, on the site of the ancient town of same name, whence the Adriatic derived its appellation. Owing to alluvial deposits the sea is now 17 miles distant. Pop. 15,678.

Adrian (ā′dri-an), the name of six popes. The first, a Roman, ruled from 772–795; a contemporary and friend of Charlemagne. He expended large sums in rebuilding the walls and restoring the aqueducts of Rome.—Adrian II, a Roman, was elected pope in 867, at the age of seventy-five years. He died in 872, in the midst of conflicts with the Greek Church.—Adrian III, a Roman, elected 884, was pope for one year and four months only. He was the first pope that changed his name on the occasion of his exaltation.—Adrian IV, originally named Nicolas Breakspear, the only Englishman that ever occupied the papal chair, was born about 1100, and died 1159. He was a native of Hertfordshire, studied in France, and became abbot of St. Rufus in Provence, cardinal and legate to Norway. Chosen pope in 1154, his reign is chiefly remarkable for his almost constant struggle for supremacy with Frederick Barbarossa, who on one occasion had been forced to hold his stirrup, and had been crowned by him at Rome (1155). He issued the famous bull (1158) granting the sovereignty of Ireland, on condition of the payment of Peter's pence, to Henry II.—Adrian V, previously called *Ottoboni da Fiesco*, of Genoa, settled, as legate of the pope, the dispute between King Henry III of England and his nobles in favor of the former, but died a month after his election to the papal chair (1276).—Adrian VI, born at Utrecht in 1459, was elected to the papal chair, January 9, 1522. He tried to reform abuses in the church, to restrain the zeal of Luther with reproaches and threats, and even attempted to excite Erasmus and Zuinglius against him. Died, 1523, after a reign of one year and a half.

Adrian, a city, capital of Lenawee county, Michigan, 59 miles w. s. w. of Detroit. It has abundant water power, municipally owned, and

large industries, including wire fence, tractors, suspenders, electrical supplies, garage equipment, etc. There is an extensive shipping trade in grain, fruits, wool, etc. Here are Adrian College, St. Joseph's Academy, and the State Industrial School for Girls. Pop. 11,878.

Adrian, PUBLIUS ÆLIUS HADRIANUS. See *Hadrian.*

Adrianople (ad-ri-an-ō′p'l) (Turkish *Edirneh*), an important city of ancient Thrace, 135 miles N. W. of Constantinople, on the Maritza (ancient *Hebrus*), at its junction with the Tunja. It is Oriental in appearance, has a splendid mosque, bazaars, etc. The streets are narrow and tortuous. It was formerly the capital of Turkey and contains a half-ruined palace of the sultans. Adrianople received its name from the Roman emperor Adrian (Hadrian). It was the residence of the Turkish sovereigns till the conquest of Constantinople in 1453. It was taken by the Russians in 1829, and here the peace of Adrianople was signed, ending the Russo-Turkish war. The Russians captured it again in 1878. Although strongly fortified it was obliged to surrender to the Bulgarians and Servians in 1913 during the Balkan war (q. v.). The city was reoccupied by the Turks and retained by them till 1919, when it was ceded to Greece by the treaty of peace with Turkey, following the European war (q. v.), 1914-18. It was formerly capital of the Turkish vilayet of Adrianople and was a commercial center, but declined in importance following the cession of Eastern Rumelia to Bulgaria in 1885. Pop. (1912) 83,000; pop. of former Turkish vilayet about 1,000,000.

Adrian's Wall. See *Roman Walls.*

Adriatic Sea (ād-ri-a′tik), an arm of the Mediterranean, stretching in a N. W. direction from the Strait of Otranto to the Gulfs of Venice and Trieste, between Italy and the Balkan peninsula. Length, about 480 miles; average breadth, about 100. The rivers which it receives, particularly the Po, its principal feeder, have produced and are still producing great geological changes in its basin by their alluvial deposits. Hence Adria, between the Po and the Adige, which gives the sea its name, though once a flourishing port, is now 14 miles inland. The east coast is bold and rocky and there are numerous rocky islands; the west coast is almost unbroken and is generally low. The principal ports of the Adriatic are Brindisi, Bari, Ancona, Venice, Trieste, Pola, Fiume.

Adsorption (ad-sorp′shun), a specialized form of the word absorption, applied to the condensation of a gas or vapor on the surface of a solid, This condensing power of solids was first discovered from the difficulty of maintaining a high vacuum, it appearing that a film of air was condensed upon the surface of the glass and was gradually given off into the vacuum. By heating the vessel while making the exhaustion this difficulty was largely overcome. Adsorption is ascribed to molecular attraction and adhesion of the gas. From this cause a solid body appears to weigh less when recently heated than when allowed to stand long in ordinary temperature.

Adularia (ad-ū-lā′ria), a very pure, limpid, translucent variety of felspar, called by lapidaries *moonstone*, on account of the play of light exhibited by the arrangement of its crystalline structure. Found on the Alps, but the best specimens are from Ceylon. So called from *Adula*, one of the peaks of St. Gothard, where specimens are got.

Adullam, CAVE OF, a cave to which David fled when persecuted by Saul, and whither he was followed by 'every one who was in distress, in debt, or discontented' (I Sam., xxii: 1, 2). The name *Adullamites* was given to an English political party, consisting of Mr. R. Lowe, Lord Elcho, and other Liberals, who opposed the majority of their party on the Franchise Bill of 1866. The term originated from a speech of Mr. John Bright, who likened the opposing members to those discontented persons that took refuge with David in the cave.

Adulteration (a-dul-tėr-ā′shun), a term applied not only in its proper sense to the fraudulent mixture of articles of commerce, food, drink, drugs, seeds, etc., with noxious or inferior ingredients, but also by magistrates and analysts to accidental impurity, and even in some cases to actual substitution. The chief objects of adulteration are to increase the weight or volume of the article, to give a color which either makes a good article more pleasing to the eye or else disguises an inferior one, to substitute a cheaper form of the article, one from which the strength has been extracted, or one given a false strength.—Many adulterations are practised for the purpose of fraudulently increasing the weight or volume of an article. Bread is adulterated with alum or sulphate of copper, which gives solidity to the gluten of damaged or inferior flour; with chalk or carbonate of soda to correct the acidity of such flour; and with boiled rice or potatoes, which enables the bread to carry more water, and thus to produce a larger

number of loaves from a given quantity of flour. Wheat flour is adulterated with other inferior flours. Milk is usually adulterated with water. The adulterations generally present in butter consist of an undue proportion of salt and water, lard, tallow, and other fats. Genuine butter should not contain less than 80 per cent. of butter-fat. Tea is adulterated (chiefly in China) with sand, iron-filings. chalk, gypsum, China clay, exhausted tea leaves, and the leaves of the sycamore, horse-chestnut, and plum. Coffee is mingled with chicory, roasted wheat, roasted beans, acorns, mangel-wurzel, rye-flour, and colored with burned sugar and other materials. Cocoa and chocolate are mixed with the cheaper kinds of arrow-root, animal matter, corn, sago, tapioca, etc. Confections are adulterated with flour and sulphate of lime. Preserved vegetables are kept green and poisoned by salts of copper. The acridity of mustard is commonly reduced by flour, and the color of the compound is improved by turmeric. Pepper is adulterated with linseed-meal, flour, mustard husks, etc. Color is given to pickles by salts of copper, acetate of copper, etc. The adulteration of liquors and wines is very commonly practised, a great variety of substances being used for this purpose, inferior wines being in this way often substituted for high-priced ones. Medicines, such as jalap, opium, rhubarb, cinchona bark, scammony, aloes, sarsaparilla, squills, etc., are mixed with various foreign substances; castor-oil adulterated with other oils; and inferior oils mixed with cod-liver oil.—The adulteration of seeds is also largely practised. Acts against adulteration have been passed in various countries and at various times, laws of this kind in Britain going back as far as 1267. The most recent and one of the most far-reaching of these laws is the Pure Food Act, passed by the United States Congress in 1906 and taking effect January 1, 1907. This requires that all articles of food or medicine offered for sale shall be labeled so as to show their exact contents, under penalty of fine and imprisonment.

Adultery (a-dul'tėr-i), the voluntary sexual intercourse of a married person with any other than the offender's husband or wife. When committed between two married persons, the offense is called double, and when between a married and single person, single adultery. The Mosaic, Greek, and early Roman law recognized the offense only when a married woman was the offender. By the Jewish law it was punished with death. In Greece the laws against it were severe. By the laws of Draco and Solon adulterers, when caught in the act, were at the mercy of the injured party. In early Rome the punishment was left to the discretion of the husband and parents of the adulteress. The punishment assigned by the Lex Julia, under Augustus, was banishment or a heavy fine. Under Constantius and Constans, adulterers were burned or sewed in sacks and thrown into the sea; under Justinian the wife was to be scourged, lose her dower, and be shut up in a monastery; at the expiration of two years the husband might take her again; if he refused she was shaven and made a nun for life. By the ancient laws of France this crime was punishable by death. In Spain personal mutilation was frequently the punishment adopted. In several European countries adultery is regarded as a criminal offense, but in none does the punishment exceed imprisonment for a short period, accompanied by a fine. In England formerly it was punishable with fine and imprisonment, and in Scotland it was frequently made a capital offense. In Great Britain at the present day, however, it is punishable only by ecclesiastical censure. In the United States the punishment of adultery has varied materially at different times. It is, however, very seldom punished criminally in the States.

Ad valo'rem (Lat., according to the value), a term applied to customs or duties levied according to the worth of the goods, as sworn to by the owner, and not according to number, weight, measure, etc.

Advance note, a draft on the owner of a vessel, generally for one month's wages, given by the master to the sailors on their signing the articles of agreement.

Advancement of Science. See *American* and *British Associations.*

Ad'vent (Latin *adventus*, an arrival, 'the coming of our Saviour'), the name applied to the holy season which occupies the four or, according to the Greek Church, six weeks preceding Christmas, and which forms the first portion of the ecclesiastical year, as observed by the Anglican, the R. Catholic and the Greek Church.

Adventists (ad'ven-tists), a group of Christian churches which make the second personal coming of Christ a special feature in their doctrine, following the teaching of William Miller (q. v.). The Advent Christian Church has a membership of 31,000. The Seventh-Day Adventist Denomination (q. v.) has

a membership in the United States of about 100,000, with 2250 churches.

Ad'verb, one of the parts of speech used to limit or qualify the signification of an adjective, verb, or other adverb; as, *very cold, naturally brave, much more clearly, readily agreed.* Adverbs may be classified as follows:—1, adverbs of time, as *now, then, never,* etc.; 2, of place, as, *here, there, where,* etc.; 3, of degree, as, *very, much, nearly, almost,* etc.; 4, of affirmation, negation, or doubt, as, *yes, no, certainly, perhaps,* etc.; 5, of manner, as *well, badly, clearly,* etc.

Advertisement (ad-vėr'tiz-ment), a notice given to individuals or the public of some fact, the announcement of which may affect either the interest of the advertiser or that of the parties addressed. The vehicle employed is generally special bills or placards and notices inserted in newspapers and periodicals, and the profit derivable from advertisements forms the main support of the newspaper press. Advertising has grown to a surprising extent, and is still growing, not only in the newspapers, but in boats, railway cars, and public buildings, on fences, rocks, and trees. The city papers are now of eight, twelve, sometimes twenty-four or more pages, of which more than half the space is occupied by advertisements. The extent and seeming extravagance of American advertising is astonishing to Europeans.

Advocate (ad'vō-kāt) (L. *advocatus*—*ad,* to, *voco,* to call), a lawyer authorized to plead the cause of his clients before a court of law. It is only in Scotland that this word seems to denote a distinct class belonging to the legal profession, the advocates of Scotland being the pleaders before the supreme courts.—The *Lord Advocate,* called also the *King's* or *Queen's Advocate,* is the principal law officer of the crown in Scotland. He is the public prosecutor of crimes in the Supreme Court, and senior counsel for the crown in civil causes. Being appointed by the crown, he goes out of office with the administration to which he belongs. As public prosecutor he is assisted by the solicitor-general and by four junior counsel called advocates-depute. In the United States and England an advocate is usually termed a counsel, counselor, or attorney-at-law.

Advocates' Library, the chief library in Scotland, located in Edinburgh, and founded about 1682 by the Faculty of Advocates, but long open to public use. In 1709 it obtained, along with eight other libraries, the right to a copy of every new book published in Britain, which right it still possesses. The number of volumes is over 500,000 and MSS. over 3000.

Advoca'tus Diab'oli (Devil's advocate), in the Roman Catholic Church, a functionary who, when a deceased person is proposed for canonization, brings forward and insists upon all the weak points of the character and life of the deceased, endeavoring to show that he is not worthy of sainthood. The opposite side is taken by the *Advocatus Dei,* God's advocate.

Advowson (ad-vou'zn), in English law, a right of presentation to a vacant benefice, or, in other words, a right of nominating a person to officiate in a vacant church. Those who have this right are styled *patrons.* Advowsons are of three kinds—*presentative, collative,* and *donative: presentative,* when the patron presents his clerk to the bishop of the diocese to be instituted; *collative,* when the bishop is the patron, and institutes or *collates* his clerk by a single act; *donative,* when a church is founded by the king, or any person licensed by him, without being subject to the ordinary, so that the patron confers the benefice on his clerk without presentation, institution, or induction.

Adytum (ad'i-tum), a secret place of retirement in the ancient temples, esteemed the most sacred spot; the innermost sanctuary or shrine. From this place the oracles were given, and none but the priests were permitted to enter it. The Holy of Holies or Sanctum Sanctorum of the Temple at Jerusalem was of this character.

Adze, a cutting instrument used for chipping the surface of timber, somewhat of a mattock shape, and having a blade of steel forming a portion of a cylindrical surface, with a cutting edge at right angles to the length of the handle.

Ædiles (ē'dilz), Roman magistrates who had the supervision of the national games and spectacles; of the public edifices, such as temples (the name comes from *ædes,* a temple); of private buildings, of the markets, cleansing and draining the city, etc.

Ædui (ē'du-i), one of the most powerful nations of Gaul, between the Liger (Loire) and the Arar (Saône). On the arrival of Julius Cæsar in Gaul (B.C. 58), they were subject to Ariovistus, but their independence was restored by Cæsar. Their chief town was Bibracte (Autun).

Ægadean Islands (ē-ga-dē'an), a group of small

islands lying off the western extremity of Sicily, and consisting of Maritimo, Favignana, Levanzo, and Le Formiche.

Ægagrus (ē-gag′rus), a wild species of ibex (*Capra ægagrus*), found in troops on the Caucasus and many Asiatic mountains, believed to be the original source of at least one variety of the domestic goat.

Ægean Sea (ē-jē′an), that part of the Mediterranean which lies between Greece, on the west and north, and Asia Minor on the east. It is studded with islands. Formerly called Archipelago (q. v.).

Ægilops (ē′ji-lops), a genus of grasses, very closely allied to wheat, and somewhat remarkable from the alleged fact that by cultivation one of the species becomes a kind of wheat.

Ægina (ē-jī′na), a Greek island in the Gulf of Ægina, south of Athens, triangular in form; area about 32 square miles; pop. 7,000. Except in the west, where the surface is more level, the island is mountainous and unproductive. The inhabitants are chiefly engaged in trade, seafaring, and agriculture, the chief crops being almonds, olives, and grain. The greater number of them reside in the seaport town of Ægina. Ægina was anciently colonized by Dorians from the opposite coast of Peloponnesus. In the latter half of the sixth century B. C. it had a flourishing commerce, a large navy, and was the seat of a distinct school of art. At the battle of Salamis (480 B. C.) the Æginetans behaved with great valor. In 456 the island fell under the power of the Athenians, and in 431 the Æginetans were expelled to make room for Athenian settlers, but were afterwards restored. On a hill are the remains of a splendid temple of Athena (Minerva), many of the columns of which are still standing. Here were found in 1811 a number of marble statues (the *Æginetan marbles*), which are now at Munich, and are prized as throwing light on the early history of Greek art. Though in these figures there is a wonderfully exact imitation of nature, yet there is a certain stiffness about them and an unnatural sameness of expression in all. They should probably be assigned to the period 500–480 B. C.

Ægis (ē′jis), the shield of Zeus, according to Homer, but according to later writers and artists a metal cuirass or breastplate, in which was set the head of the Gorgon Medusa, and with which Athena (Minerva) is often figured as being protected. In a figurative sense the word is used to denote some shielding or protecting power.

Ægle (ē′glē), a genus of plants. See *Bel.*

Ægospotami (ē-gos-pot′a-mī), ('goat rivers') a place on the Hellespont, of some note in Greek history, the Athenian fleet being here completely defeated in 405 B. C. by the Spartan Lysander, thus ending the Peloponnesian war.

Ælfric (al′frik), Abbot, called *Grammaticus* (the grammarian), was a celebrated English author of the eleventh century. He became a monk of Abingdon, was afterwards connected with Winchester, and died Abbot of Ensham. His principal works are two books of homilies, a *Treatise on the Old and New Testaments*, a translation and abridgment of the first seven books of the Bible, a *Latin Grammar and Glossary*, etc. He has been frequently confounded both with Ælfric, Archbishop of Canterbury, and Ælfric, Archbishop of York, who lived about the same time.

Ælianus (ē-li-ā′nus), Claudius, often called simply Ælian, a Roman author who lived about A. D. 221, and wrote in Greek a collection of stories and anecdotes and a natural history of animals.

Ælst (älst), a Belgian town, same as *Alost.*

Æneas (ē-nē′as), the hero of Virgil's *Æneid*, a Trojan, who, according to Homer, was, next to Hector, the bravest of the warriors of Troy. When that town was taken and set on fire, Æneas, according to the narrative of Virgil, with his father, son, and wife Creusa, fled, but the latter was lost in the confusion of the flight. Having collected a fleet he sailed for Italy, but after numerous adventures he was driven by a tempest on the coast of Africa, where Queen Dido of Carthage received him kindly, and would have married him. Jupiter, however, sent Mercury to Æneas, and commanded him to sail for Italy. While the deserted Dido ended her life on the funeral pile Æneas set sail with his companions, and after further adventures by land and sea reached the country of King Latinus, in Italy. The king's daughter Lavinia was destined by an oracle to a stranger, this stranger being Æneas, but was promised by her mother to Turnus, king of the Rutuli. This occasioned a war, after the termination of which, Turnus having fallen by his hand, Æneas married Lavinia. His son Ascanius, by Creusa his first wife, was the legendary ancestor of the kings of Alba Longa, and of Romulus and Remus, the founders of the city of Rome.

Æolian Harp (ē-ō′li-an harp), a musical instrument generally consisting of a box of thin fibrous wood (often of deal), to which are attached from eight to fifteen fine catgut strings or wires, stretched on low bridges at each end, and tuned in unison. Its length is made to correspond with the size of the window or other aperture in which it is intended to be placed. When the wind blows athwart the strings it produces very beautiful sounds, sweetly mingling all the harmonic tones, and swelling or diminishing according to the strength or weakness of the blast. Its name is derived from Æolus (which see).

Æolians (ē-ō′li-ans) (Gr. Αἰολῆς), one of the four races into which the ancient Greeks were divided, originally inhabiting the district of Æŏlis, in Thessaly, from which they spread over other parts of Greece. In early times they were the most numerous and powerful of the Hellenic races, chiefly inhabiting Northern Greece and the western side of Peloponnesus, though latterly a portion of them went to Lesbos and Tenedos and the northwest shores of Asia Minor, where they possessed a number of cities. Their language, the Æolian dialect, was one of the three principal dialects of the Greek. It was cultivated for literary purposes chiefly at Lesbos, and was the dialect in which Alcæus and Sappho wrote.

Æol′ipile (L. *Æŏli pila*, the ball of Æŏlus), a spherical vessel of metal, with a pipe of small aperture, through which the vapor of heated water in the ball passes out with considerable noise; or having two nozzles so placed that the steam rushing out causes it to revolve on the principle of Barker's mill. It was known to the ancient Greeks.

Æolus (ē′o-lus), in Greek mythology, the god of the winds, which he kept confined in a cave in the Æolian Islands, releasing them when he wished or was commanded by the superior gods.

Æon (ē′on), a Greek word signifying life, an age, and sometimes eternity, but used by the Gnostics to express spirits or powers that had emanated from the Supreme Mind before the beginning of time. They held both Christ and the Holy Spirit to be æons; but as they denied the divine origin of the books of Moses, they said that the spirit which had inspired him and the prophets was not that exalted æon whom God sent forth after the ascension of Christ, but an æon very much inferior, and removed at a great distance from the Supreme Being.

Æpyornis (ē-pi-or′nis), a genus of gigantic birds whose remains have been found in Madagascar, where it is supposed to have lived perhaps not longer than 200 years ago. It had three toes, and is classed with the cursorial birds (ostrich, etc.). Its eggs measured 14 inches in length, being about six times the bulk of those of the ostrich.

Æqui (ē′qui), an ancient people of Italy, conspicuous in the early wars of Rome, inhabiting the mountain district between the upper valley of the Anio (Teverone) and Lake Fucinus, and probably akin to the Volscians. They were defeated by Cincinnatus in B. C. 458, and again by the dictator Posthumus Tubertus in B. C. 428, and were finally subdued about B. C. 304-302.

A′erated Bread, bread which receives its sponginess or porosity from carbonic acid supplied artificially, and not produced by leaven or yeast.

A′erated Waters, waters impregnated with carbonic acid gas, and forming effervescing beverages. Some mineral waters are naturally aërated, as Vichy, Apollinaris, Rosbach, etc.; others especially, such as are used for medicinal purposes, are frequently aërated to render them more palatable and exhilarating. Water simply aërated, or aërated and flavored with lemonade or fruit syrups, is largely used, especially in summer, as a refreshing beverage. There are numerous varieties of apparatus for manufacturing aërated waters. The quantity of gas with which the water is charged is usually equal to a pressure of 5 atmospheres.

Aerians (a-e′ri-ans), the followers of Aërius, who in the fourth century originated a small heretical sect, objecting to the established feast-days, the distinction between bishops and presbyters, prayers for the dead, etc.

Aeroboat, a speed motorboat capable of 50 miles an hour on water. To the hull are attached the aeroplane surfaces of a standard aeroplane, so that the boat can at any moment rise from the surface of the water and attain a speed of 65 miles or more an hour. It may further be equipped with wheels, so that it can rise from or return to the ground instead of the water. The boat hull construction lends itself to endless modifications and improvements, especially in the matters of size and weight.

Aerodrome (ā′er-ō-drōm), a building in which to keep aeroplanes or an enclosure for testing them.

Aerodynamics (ā-er-ō-dī-nam′iks), a branch of physical science which treats of the properties and motions of elastic fluids (air, gases), and of the appliances by which these are ex

emplified. This subject is often explained in connection with hydrodynamics.

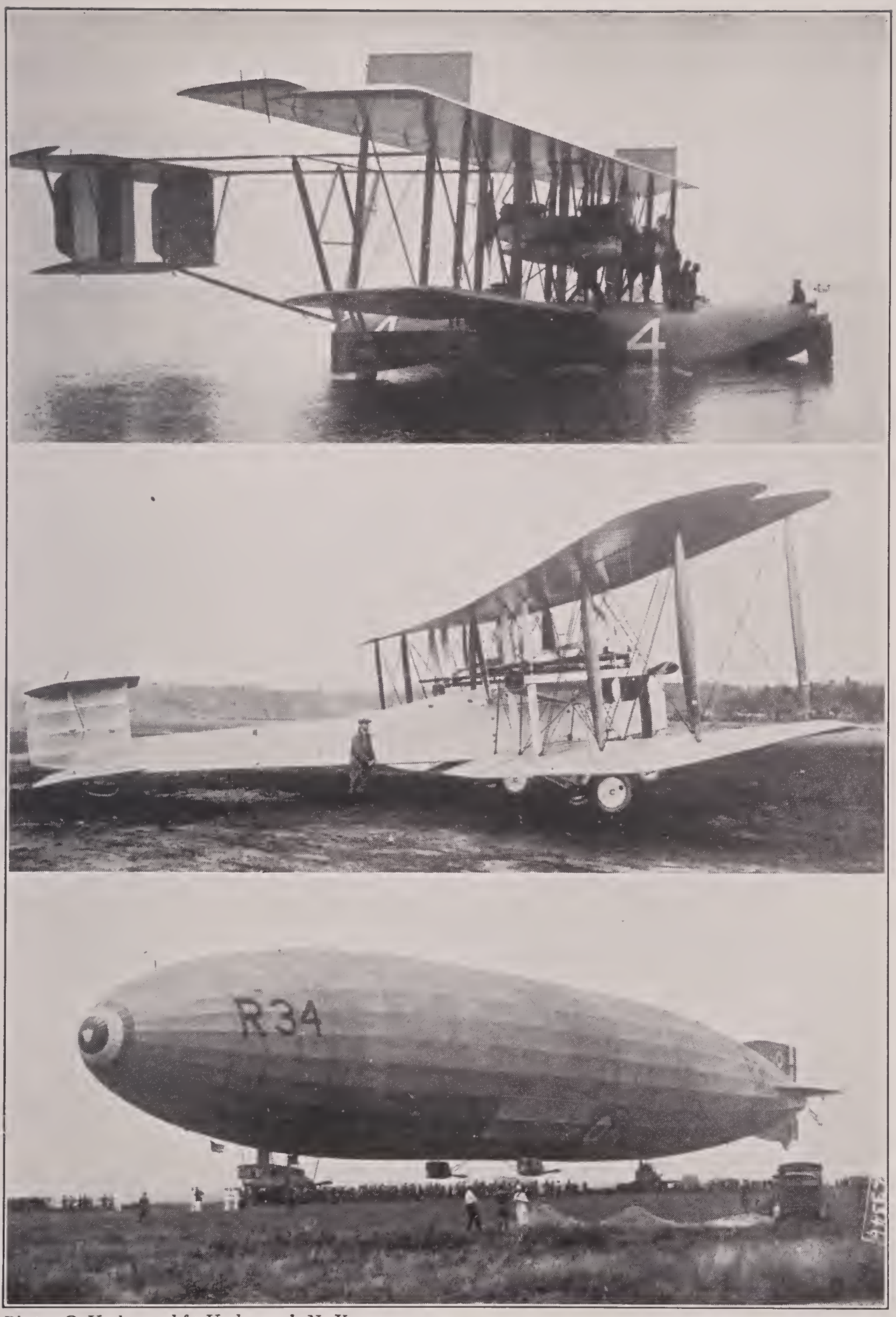
Aeröe, or Arroe (är'eu-e), an island of Denmark, in the Little Belt, 15 miles long by 5 broad, with 12,000 inhabitants. Though hilly, it is very fertile.

Aerolite (ā'er-ō-līt), a meteoric stone, meteorite, or shooting-star. See *Meteoric Stones*.

Aeronautics (ā-er-ō-nau'tiks), the art of sailing in or navigating the air. The first form in which the idea of aërial locomotion naturally suggested itself was that of providing men with wings by which they should be enabled to fly. This is now known to surpass the muscular power of man, and all actual efforts at flight have been by the aid of some kind of elevating apparatus.

Balloons. The navigation of the air by means of the balloon dates only from about the close of the eighteenth century. In 1766 Henry Cavendish showed that hydrogen gas was at least seven times lighter than ordinary air, and it at once occurred to Dr. Black of Edinburgh that a thin bag filled with this gas would rise in the air, but his experiments were for some reason unsuccessful. Some years afterwards Tiberius Cavallo found that a bladder was too heavy and paper too porous, but in 1782 he succeeded in elevating soap-bubbles by inflating them with hydrogen gas. In this and the following year two Frenchmen, the brothers Stephen and Joseph Montgolfier, acting on the observation of the suspension of clouds in the atmosphere and the ascent of smoke, were able to cause several bags to ascend by rarefying the air within them by means of a fire below. These experiments roused much attention at Paris; and soon after a balloon was constructed under the superintendence of Professor J. A. C. Charles, which being inflated with hydrogen gas rose over 3000 feet in two minutes, disappeared in the clouds, and fell after three-quarters of an hour about 15 miles from Paris. These Montgolfier and Charles balloons already represented the two distinct principles in respect to the source of elevating power, the one being inflated with common air rarefied by heat, requiring a fire to keep up the rarefaction, the other being filled with gas lighter at a common temperature than air, and thus rendered permanently buoyant. Both forms were used for a considerable time, but the greater safety and convenience of the gaseous inflation finally prevailed. After the use of coal-gas had been introduced it superseded hydrogen gas, as being much less expensive, though having a far less elevating power. The first person who made an ascent was Pilâtre de Rozier, who ascended 50 feet at Paris in 1783 in one of Montgolfier's balloons. A short time afterwards M. Charles and M. Robert ascended in a balloon inflated with hydrogen gas, and traveled a distance of 27 miles from the Tuilleries; M. Charles by himself also ascended to a height of about 2 miles. Of the earlier balloonists we may mention Lunardi, who made an ascent in Great Britain in 1784; Blanchard, who, along with the American Dr. Jeffries, first crossed the Channel from Dover to Calais, in 1785; Garnerin, who made the first successful descent by a parachute in 1797; and Gay Lussac, who reached the height of 23,000 feet in 1804. In 1836 a balloon carrying Messrs. Green, Holland, and Mason traversed the 500 miles between London and Weilburg in Nassau in eighteen hours. In 1859 Mr. J. Wise, the chief of American aëronauts, accompanied by several others, rose from New York, and landed, after a flight of 1150 miles, in twenty hours. In Sept., 1862, the renowned aëronaut, Mr. Glaisher, accompanied by Mr. Coxwell, made an ascent from Wolverhampton, and reached the elevation of 37,000 feet, or 7 miles. According to the geographical institute at Pavia, Italy, the highest altitude reached by any balloon was achieved by the Italian aviator, Giacomo Piccolo, who rose to a height of 105,000 feet, slightly over 18 miles above sea level; and 104,082 feet above actual ground. At the height of 59,196 feet the temperature fell to minus 43 degrees and maintained that figure all the way up with only slight variation. Piccolo was compelled to utilize his oxygen inhalator after he reached the height of 2 miles.

The balloon was adapted to scientific investigation at an early date, Prof. Charles making barometer and thermometer readings in 1783. Dr. Jeffries made the first purely scientific ascent in 1784 and the first important observations were made by Gay Lussac and Biot in 1804. The records of Glaisher and Coxwell, from 1862 to 1866, were long regarded as standards until modified by Assman in Germany, who made several important ascents with Gross and Besson in 1887, reporting meteorological faults and atmospheric conditions. Little change has been made in balloons since that built by Prof. Charles in 1783 with the exceptions of the ripping panel invented by Wise, by means of which the top of the balloon can be torn out, allowing the gas to escape rapidly for quick descent, and the drag rope devised by Green to steady the flight. This consists of a long rope trail-



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TRANSATLANTIC FLIERS

Top: American Navy Seaplane NC-4 which crossed the ocean with one stop at the Azores, reaching Portugal, May 27, 1919. *Center:* The British Vickers-Vimy bombing plane, which made the first non-stop flight across the Atlantic, June 16, 1919. *Bottom:* The British Dirigible R-34 which flew across the Atlantic, July 6, 1919.

ing below the car. Its function is to reduce the waste of gas and ballast required to keep the balloon at a proper altitude. When a balloon sinks so low that a good deal of the rope rests on the ground, it is relieved of so much weight and therefore tends to rise; if, on the other hand, it rises so that most of the rope is lifted off the ground, it has to bear a greater weight and tends to sink. The usual type of balloon is a pear shaped or round bag of pliable cloth, preferably silk, which has been coated with rubber dissolved in varnish. The size of the bag varies from 20 to 30 feet in diameter and is of approximately equal height. The mouth or neck of the bag is just large enough to admit a man to make repairs. The outside of the balloon is covered by a closely fitted net of cord, the ends of which are fastened to a circular hoop placed a few feet below the neck. The car, generally a large wicker basket, is suspended some distance below the hoop by ropes attached to it. The net serves to distribute the weight of the car and its contents over the whole top of the balloon. An important feature of balloon construction is the valve, a wooden or metal clapper, from 1 to 3 feet in diameter, placed in the top of the bag. It opens inward and is ordinarily kept closed by springs. The rope by which this valve is opened hangs straight down through the neck of the balloon and is usually allowed to hang loose, to avoid any chance of accidental opening. The car itself is equipped with sandbags as ballast, thermometers, barometers, hygrometers, compasses, maps and a long rope with an anchor for stopping the balloon when it nears the ground, in addition to the drag rope before mentioned.

Military Balloons. The adaptation of the balloon to military use promptly followed its discovery. Soon after the beginning of the French revolutionary war an aëronautical school was founded at Meudon and four military observation balloons constructed for the armies of the North, of the Sambre and Meuse, of the Rhine and Moselle, and of Egypt. In June, 1794, Colonel J. M. J. Coutelle ascended with the adjutant and general to reconnoitre the hostile army just before the battle of Fleurus and two reconnaisances were made of four hours each and it is generally stated that the information so gained was responsible for the French victory. The balloon corps was often used after this and the enemy was much disconcerted at having their movements so completely watched. From this time on the military observation balloon was used in most campaigns with more or less success. In the American Civil war (1861) balloons were in considerable use by the Federal armies. There was a regular balloon corps attached to McClellan's army. During the siege of Paris (1870) balloons were very useful, providing the only means of communication with the outside world. Sixty-four were sent up. Ballooning as a recognized military science only dates back to about 1883 or 1884, when most of the great powers organized regular balloon establishments. A military observation balloon is captive and the cable which tethers it also carries telephone wires; the observer is thus able to keep in constant communication with his base.

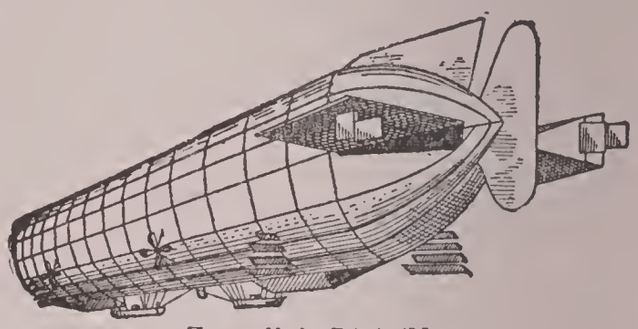
In 1885 captive balloons were first used by the British army in the Sudan war. They were spherical—a shape which is still retained in some instances, though it has been supplanted to a large extent by the fantastic kite balloon. The British balloons are made of goldbeater's skin and range in capacity from 7000 to 10,000 cubic feet. The French balloon is larger, having a capacity of over 18,000 cubic feet; but smaller balloons are used as auxiliaries. The captive spherical balloon has done good service, but it is satisfactory only in calm weather. Endeavors to evolve a superior type of captive balloon which would have stability in spite of the wind, resulted in the Parseval-Siegsfeld observation balloon, known as the kite-balloon. It has the form of a cylinder with its axis horizontal. At one end there is an odd-looking surrounding outer bag, which is designed to prevent the balloon from spinning on its axis. The lower end of this outer bag is open, making it serve the purpose of a balloonet. The wind entering the balloonet steadies the main vessel somewhat in the manner of the tail of a kite. Hence the name applied to these captive balloons. All the belligerents in the Great war have made use of this type as an artillery 'spotter.'

Dirigible Balloons. Very soon after the invention of balloons the problem of how to propel them against the wind arose. An elongated balloon propelled by oars was proposed by General J. B. M. C. Meusnier and tried by the brothers Robert in 1874, who made four ascents. It was realized, however, that hand power was insufficient and experiments ceased until 1852, when Henri Gifford ascended with a very light steam engine for the period, it weighing only 154 pounds per horsepower, with fuel and water for one hour. He was not successful in stemming a moderate wind, however. In 1870 Dupuy de Lome was commissioned by the French government during the

siege of Paris to build a dirigible. He ascended with eight men to turn the screw propeller and succeeded in obtaining a deviation of 12° from a wind blowing 27 to 37 miles per hour. Tissandier and his brother had some success with a light electric motor in 1883 and 1884. The dirigible "La France" was built by Renard and Krebs, the officers in charge of the French War Aëronautical Department at Meudon in 1884 and 1885. The propeller was in front of the car and was driven by an electric motor. Seven ascents were made on calm days and the dirigible returned to its starting place in five of them. This apparatus attained a maximum speed of 14 miles per hour. In 1897, after years of experiment, a cigar-shaped balloon driven by a gasoline motor was completed by Dr. Wölfert in Berlin. An explosion took place in the air, however, and the inventor and his assistant were killed in the fall. In the same year an aluminum balloon was built from the designs of D. Schwarz in Berlin and equipped with a Daimler gasoline motor. It attained a greater speed than "La France," but met with an accident and was damaged beyond repair.

It was developed by these early experiments that a light and powerful source of motive power was needed for the successful realization of the hopes of the inventors. This need was supplied by the internal combustion engine, which from 1900 on began to be developed in hitherto unheard of lightness of weight in relation to power. Other questions arose, however. In order to drive the gas bag economically and efficiently through the air it must be kept inflated. Two systems have been used to effect this. In one, the envelope is kept in the proper shape entirely by inflation, which is accomplished by inflating with air small bags or balloonets contained in the gas bag. This type has been perfected in the German Parseval airship. The other system is that developed by Count Zeppelin, of a rigid framework covered with fabric, the gas being stored in separate drum-shaped compartments inside the frame. A third system, using both principles, is found in the French semi-rigid type, in which a collapsible envelope with internal balloonets, is stiffened by a rigid keel extending beneath the envelope from which the car is suspended.

German Dirigibles. From 1897 on, experiments were conducted by Count Ferdinand von Zeppelin of the German Army on an immense airship to carry five men. It consisted of a rigid cylindrical aluminum framework with pointed ends, containing sixteen gas bags with a total capacity of nearly 400,000 cubic feet. Two cars were suspended from the framework, each containing a 16 horsepower motor. On its first test in June, 1900, it

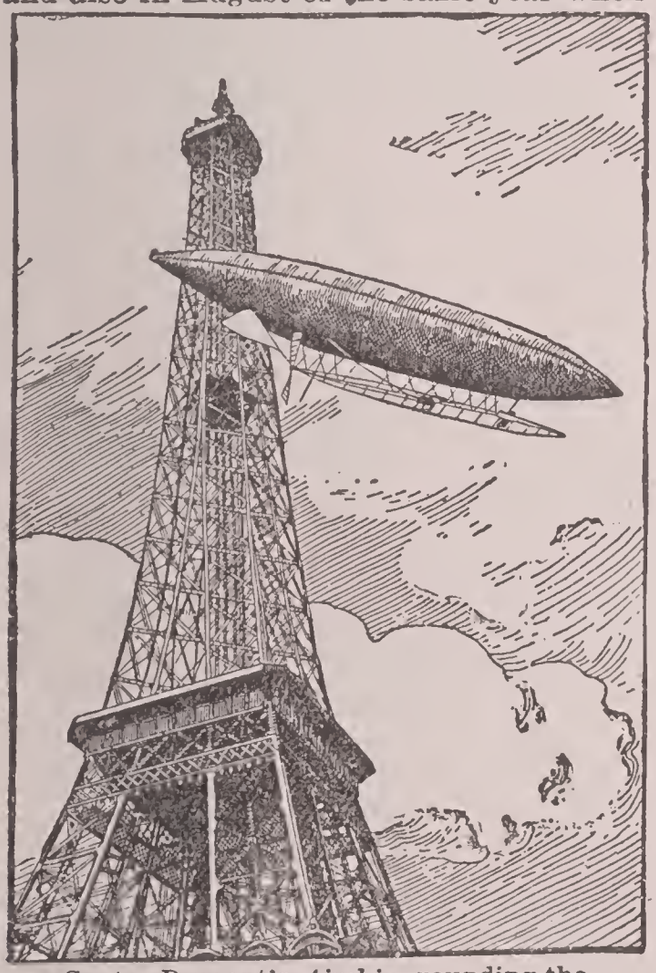


Zeppelin's *Dirigible.*

made a speed of 18 miles per hour and traveled 3½ miles before an accident to the steering gear forced it to descend. A second airship, whose two motors developed 85 horsepower, was built in 1905, but was wrecked in a storm. A third ship, built in 1906, traveled around Lake Constance and reached a speed of 36 miles per hour, remained in the air for several hours, carrying a number of passengers. A fourth airship, of similar design but more powerful motors, in 1908 succeeded in traveling 250 miles in 11 hours, but was wrecked when on land and burned at Echterdingen. Subscriptions were at once raised to help Zeppelin build another, and from this beginning grew Germany's fleet of monster airships which were used in bombing raids and for purposes of observation in the European war (*q. v.*). Other dirigibles were the Parseval, developed by Major von Parseval of the Bavarian army, whose airship was of a collapsible type without a rigid frame, which could be readily transported by an army and inflated in the field from cylinders of compressed gas or generators; the Gross airships, designed by Major von Gross of the German army, of a semi-rigid type; the Schütte-Lanz, a rigid airship with wooden frame and large gas capacity; the Suchard, built for long distance travel, but not used for the ocean flights for which it was designed.

The Zeppelin was considered the supreme war dirigible, but with the increasing defensive ability of the anti-aircraft guns and the armored aeroplanes the destructive power of the big rigid airships has been greatly reduced. Many Zeppelin raids on London and other towns in England were undertaken during the European war, at first with success but later with disastrous results to the huge airships, some of which containing from 750,000 to 2,000,000 cubic feet of gas, and costing

from $1,000,000 to $2,500,000, were captured by the British forces. Toward the end of 1917 the Zeppelin had been discarded for the heavier-than-air machines, and squadrons of bomb-carrying aeroplanes took up the work of raiding. The multiple-gas bag system of the Zeppelin protects the huge airship to some extent, for two or three of these gas compartments may collapse without bringing the Zeppelin to earth; but gunners use incendiary shells which set aflame the balloon. For scouting purposes the Zeppelin proved its worth, not only on land but on sea. It was used for observation in the naval battle off Jutland Bank in May, 1916, and also in August of the same year when



Santos Dumont's *Airship*, rounding the Eiffel Tower.

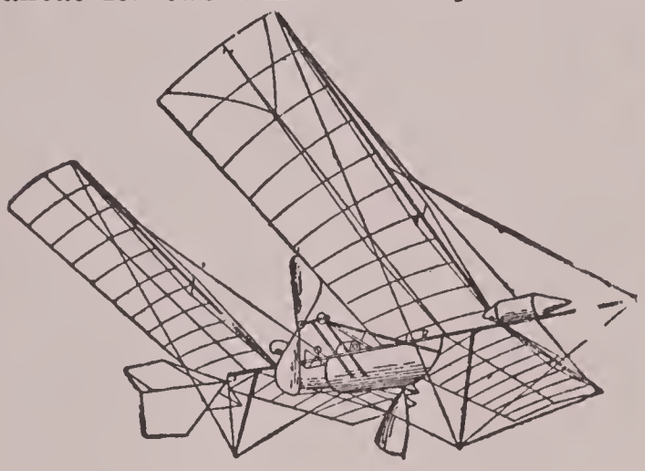
the German high sea fleet steamed toward England.

French Dirigibles. During the same period experiments with dirigibles were conducted in Paris by Alberto Santos Dumont, who won the prize of 100,000 francs offered by Henri Deutsch de la Meurthe, in October, 1901, by traveling around the Eiffel Tower and back to his starting place in half an hour. Other successful airships of this period were those of Pierre and Paul Lebaudy, which made a speed of 25 miles per hour with several passengers in the vicinity of Paris in 1903, using a 40-horsepower motor driving a steel propeller at 1000 revolutions per minute; the 'Lebaudy,' built by them in 1904; a new Lebaudy in 1905, which proved very successful in army use; 'La Patrie,' built by Lebaudy brothers in 1906, which was successful until carried away by a storm and destroyed in 1907; 'La Republique,' built on similar lines to the Lebaudy airships, which was destroyed by the breaking of one of the propeller blades; the semi-rigid 'Ville de Paris,' 'Clement-Bayard,' and 'France,' and in 1912 the rigid wooden-framed 'Spiess,' with a gas capacity of 371,000 cubic feet. By 1913 a considerable fleet of capable airships had been put in commission, chiefly of the non-rigid type, of about 318,000 cubic feet capacity and 34 miles per hour speed.

American Dirigibles. Comparatively little progress had been made in the United States in airship building up to the American entry into the European war. A moderate size dirigible was designed and constructed by Capt. Thomas S. Baldwin in 1908 and accepted by the government for the Army Signal Corps. It had a capacity of 20,000 cubic feet and was driven by a 20-horsepower gasoline engine, developing a speed of about 20 miles per hour. Two airships were built by Melvin Vaniman. In one of these, named 'America,' Walter Wellman tried to cross the Atlantic in 1910. The engines failed, however, and the airship drifted 1008 miles in 71 hours. The crew were rescued after abandoning the airship. Vaniman designed a new dirigible, the *Akron*, and essayed the flight to Europe with a crew of four men in 1912. An explosion totally destroyed the airship, Vaniman and his crew perishing. A gallant attempt to accomplish the flight across the ocean was made by the United States Navy dirigible, C-5, but this came to disaster on the afternoon of May 15, 1919, when after a successful flight from Montauk, N. Y., to Halifax, N. S., the C-5 broke from its moorings, was blown out over the sea and destroyed. The first dirigible to fly over the Atlantic was the British rigid airship, R-34, on July 2-6, 1919. (For airplane ocean flights see *Aeroplane.*) The giant British dirigible R-38, which was to have been turned over to the American Navy as the ZR-2, collapsed and burned at Hull, England, August 24, 1921, killing 42 men, including 16 Americans.

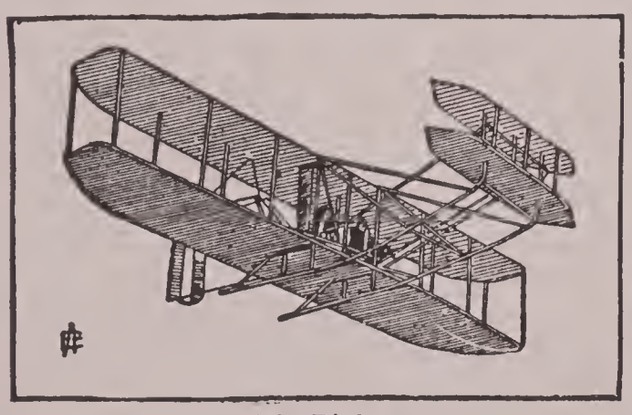
Aeroplane (ā'er-ō-plān), a flying machine heavier than air, and sustained by aid of propulsion from a source of power and the lifting action of the air on moving planes. Interesting ex-

periments in this field of flight were made by Otto Lilienthal, Hiram S. Maxim, and Prof. S. Langley near the close of the nineteenth century. These led to the conception of the aeroplane, or gliding machine, efforts to develop which were first begun in 1900 by two Americans, Orville and Wilbur Wright, of Dayton, O., whose experiments were made on a desolate sandy plain at Kitty Hawk, N. C. The first actual flight was made in September, 1902, when their crude machine kept afloat for two minutes. They continued



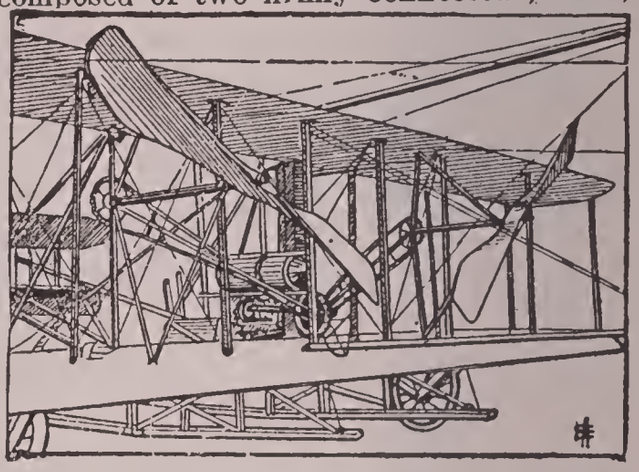
Langley's *Aeroplane.*

their experiments in secret for several years, 1908 being the first year of public aviation. Flights of considerable duration had been made, and on Sept. 10, 1908, Orville Wright remained in the air 62 minutes, 15 seconds, at Fort Meyer, near



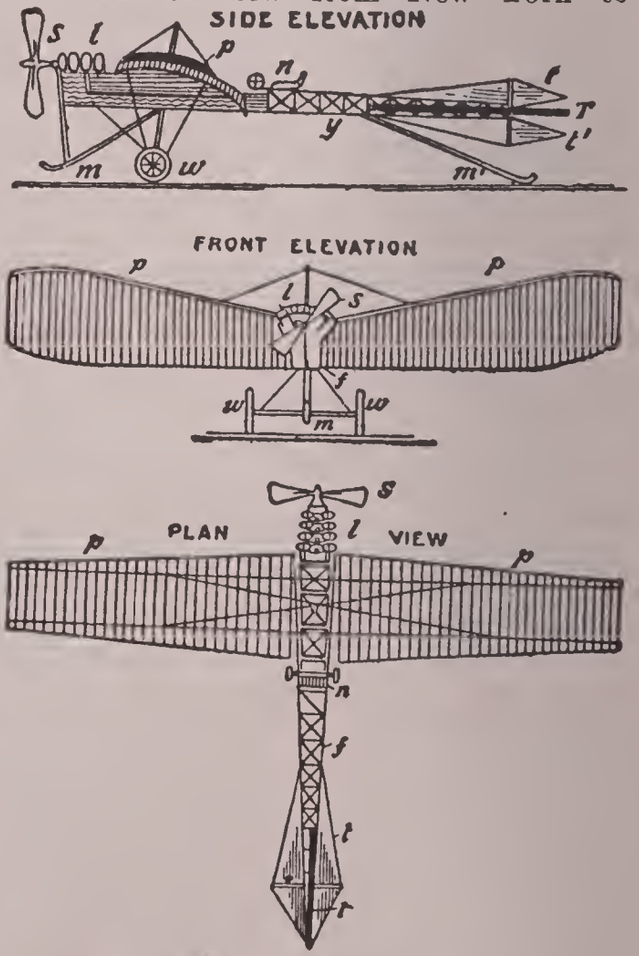
Wright Biplane.

Washington. By this time many others were experimenting, especially in France, the first notable achievement that followed being the crossing of the English Channel by Jean Bleriot, on July 25, 1909. Count de Lesseps paralleled this feat in May, 1910, and on June 2, Charles S. Rolls, a young Englishman, surpassed it, doubly crossing the Channel from Dover to Calais and return, the flight of 50 miles being made in 90 minutes. The records for long flight, up to this time, were those of Louis Paulhan, who flew from London to Manchester (117 miles) and won a prize of $50,000, and Glenn H. Curtiss, who, on May 29, 1910, flew from Albany to New York, a distance of 150 miles, at an average speed of 51 2/3 miles per hour. Machines of two types were used in these flights, the biplane, composed of two firmly connected planes,



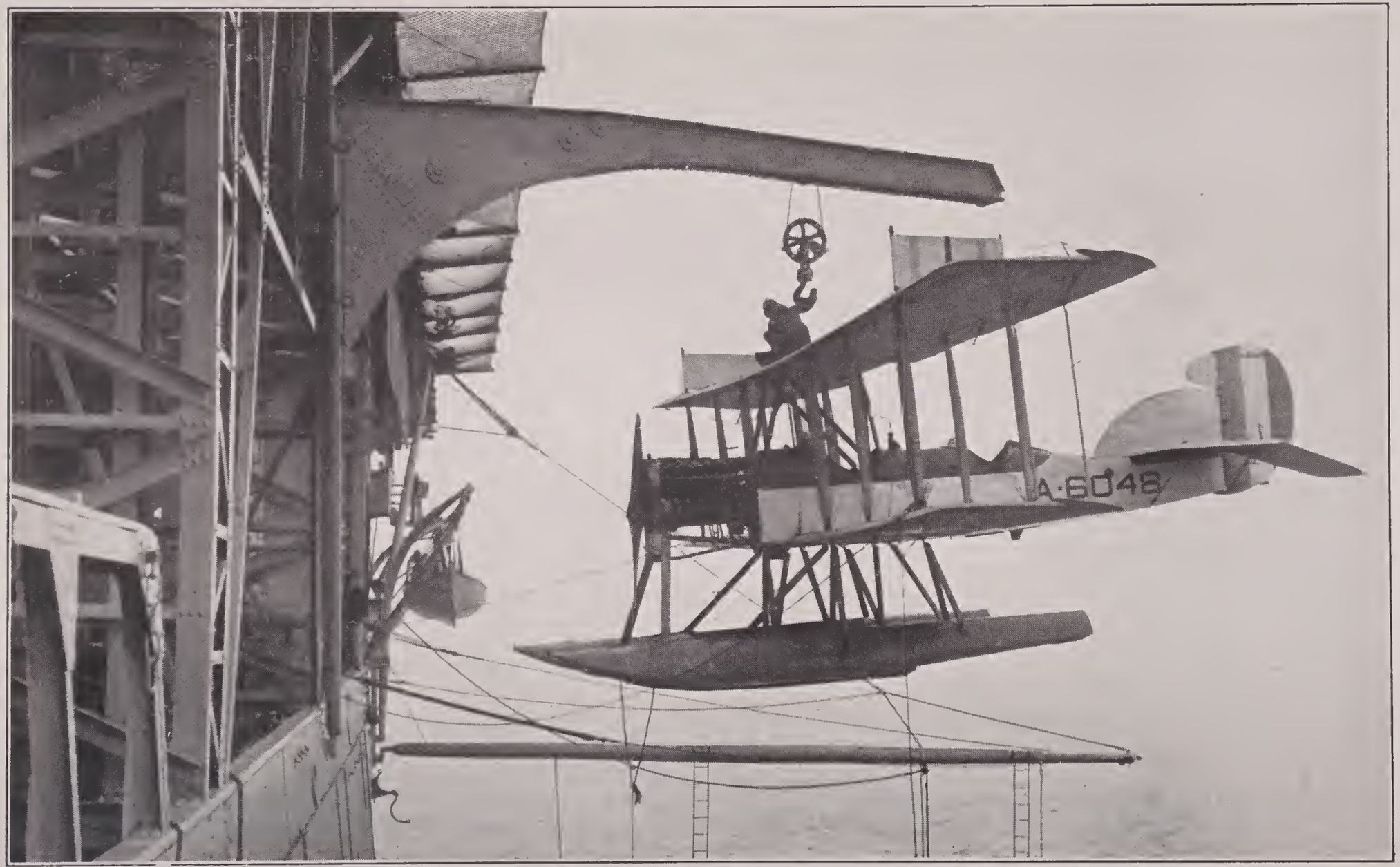
Wright Biplane. (rear).

the type of the Wright machine, and the monoplane, or single gliding plane, used by Bleriot. On June 13, 1910, Charles K. Hamilton flew from New York to



Plans of Antoinette *Monoplane*

Philadelphia, a distance of 88 miles, in 1 hour 51 minutes, and returned to New York. In the latter half of 1910 aeroplane flights were very numerous, alike in the United States and Europe, and



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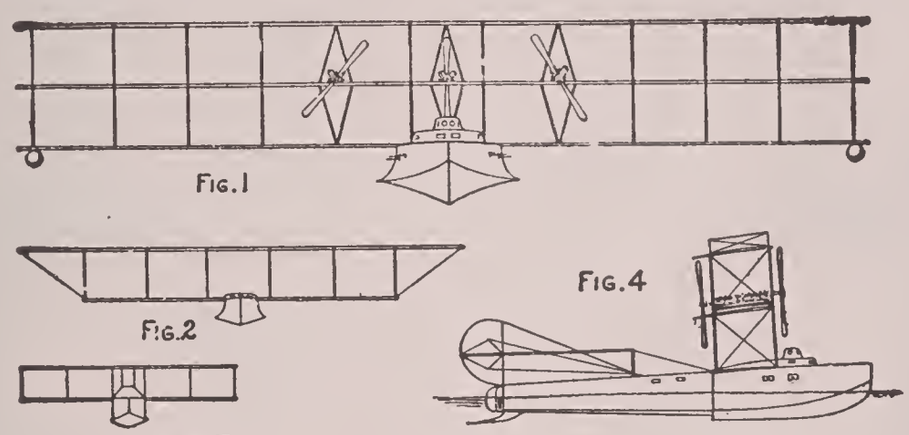
HOW PLANES ARE STOWED AWAY IN AIRPLANE CARRIER

A view of the airplane carrier, U. S. S. *Langley*, which shows graphically how easily a seaplane or airplane may be stowed away under the deck. A crane is hoisting the plane to be lowered into the ship's hangar.

records for duration, distance, number of passengers carried, and altitude have grown more remarkable each year. A few months before the opening of the great war, in 1914, Paulet made a record for duration without stopping, of 9 hours and 45 minutes. This was far exceeded during the war and by the famous cross-Atlantic flights of Lieut.-Com. Read and Captain Sir John Alcock, in 1919, and by Captain Ross Smith's England-Australia flight at the end of the same year. In 1920 Lieuts. Bossoutrol and Bernard made a continuous flight of 24 hours, 19 minutes, at Etampes, France. Among long-distance trips may be mentioned that



Comparison of the Curtiss Triplane flying boat (Fig. 1) of 133-foot span, with the 'America' (Fig. 2) of 72-foot span, and the standard hydro-aeroplane (Fig. 3) of 35-foot span. Fig. 4 is a side view of the machine.

of Clifford Webster, in a Curtiss flying boat, from Florida to New York, 1345 miles, in 18 hours, 27 minutes. The Gordon Bennett international speed trophy was won permanently by France when Sadi Lecointe covered 188 miles in 66 minutes, 8 seconds, in August, 1920. Major R. W. Schroeder, United States Army, established a new world's altitude flight in 1920 at Dayton, Ohio, reaching a height of 36,020 feet according to his barograph, but adjusted calculations reduced this to 33,114 feet. This was exceeded in September, 1921, by Lieut. John A. Macready, U. S. Army, who reached 40,800 feet.

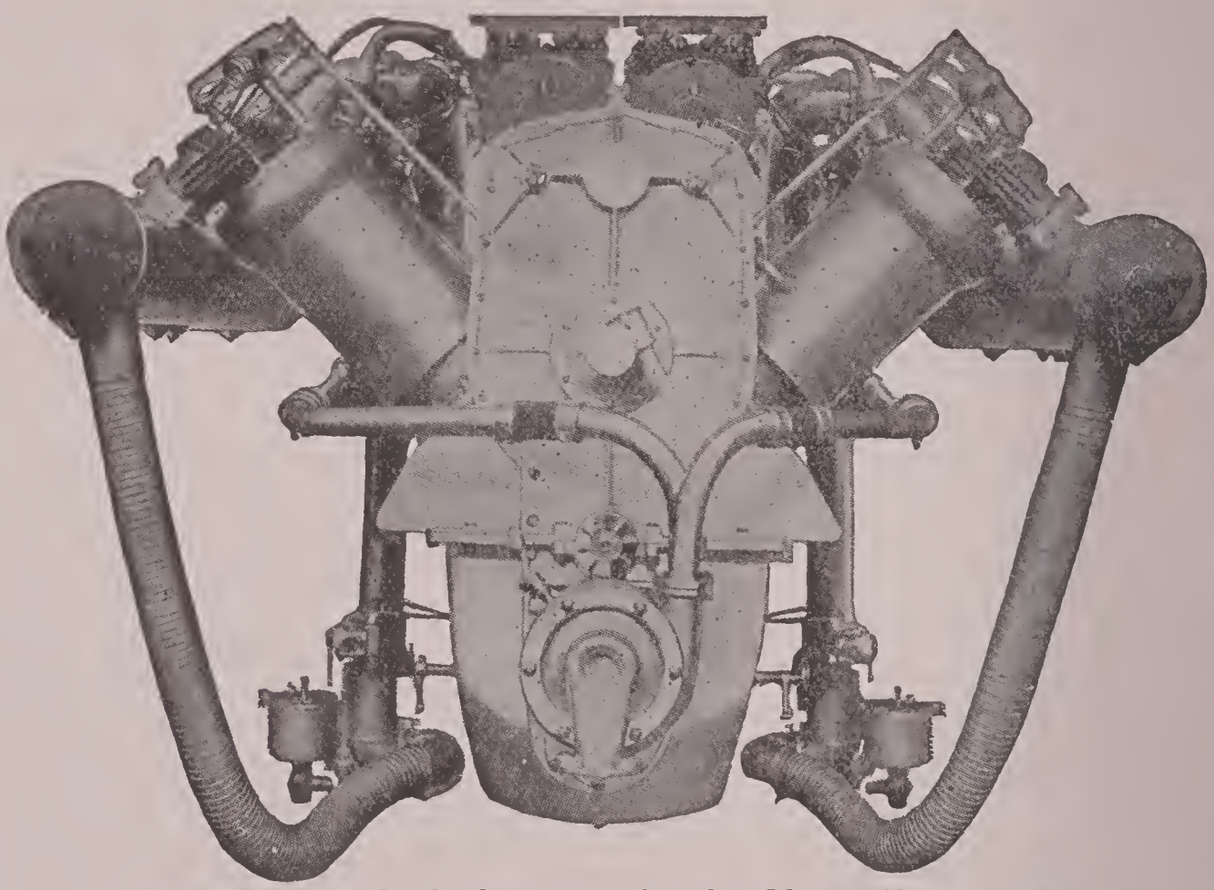
Military Aeroplanes.—For military purposes the aeroplane has proved itself of incalculable benefit. So far as scouting is concerned, it has practically superseded cavalry. An aviator flying over the enemy lines may not only observe the movements of troops and take long-distance photographs of entrenchments, but in an artillery duel he can convey the range to the gunners, indicate targets, check and correct the fire, communicating with the base by means of signals or wireless telegraphy. Machine guns have been mounted on war planes for attack and defense in the air. Bomb chambers have been added, and bombardments from the air were of frequent occurrence in the European war.

The French were the first to see the military possibilities of the aeroplane and in 1912 appropriated $5,000,000 to military aeronautics. Following the example of France, Germany appropriated $3,000,000 for this new arm of the military establishment. For several years Germany had regarded the Zeppelin airships as the superior of the heavier-than-air type, but the success of the speedy French monoplanes and biplanes came as a shock to the Zeppelin builders and Germany entered with vigor upon the task of aeroplane construction, increasing the appropriations to $10,000,000 in 1913. Russia, Japan, Austria, Italy, and finally England and the United States, in the order named, prepared more or less elaborate aeroplane programs. The United States, after entering the European war, appropriated $640,000,000 for aeroplane construction.

The biplane has been favored by America for military purposes, but both monoplanes and biplanes have done splendid service in war: the monoplane for general observation work; the armored biplane for offensive. Bomb-carrying biplanes in company with Zeppelins were used by Germany in attacks on Great Britain and France. The Allies countered with air raids on supply stores, bridges, aerodromes, and so forth, in territory occupied by the Teutonic forces. For bombing, aeroplanes have special chambers. Renaud's apparatus for discharging bombs has three tubes; the projectiles are dropped by the pressure of the operator's foot upon a pedal keyboard fixed in front of him. Some of the bombing planes carry as much as 1000 pounds of explosives. It is estimated that in 1916 the Allies carried out a total of 750 aerial bombardments. The French claimed

250 bombardments and estimated that the British had made 180 between Ypres and the Somme. The two allies also conducted most of the 174 bombardments in the Balkans.

It is difficult to ascertain the exact strength of the aerial armies at the beginning of the war in 1914, but from the most reliable estimates France seems to have had 1500 aeroplanes, Germany 1000 machines in the military establishment and 300 or 400 drawn from private



Curtiss Eight-cylinder 200-horse-power Aeroplane Motor. View from rear.

owners after mobilization; Russia, 800 machines, of which 150 were contributed from private sources. And here it may be said that Russia was ready with dirigibles as well as aeroplanes, having 20 of these, for the most part small vessels, in the military service. Great Britain and Belgium had probably less than 200 aeroplanes between them. Including the Italian and Austrian nations and the smaller powers engaged in the war in 1914, it is estimated that there were in readiness in Europe an aggregate of 4980 aircraft of all descriptions for active service and reserve.

The types of aeroplanes in use when hostilities broke out were: the Russian biplane, 'Russki Wyas,' which carried a deck house; the French Dorand and Voisin biplanes and the Nieuport monoplane; the British Bullet, which did good work in the early campaigns; and the German 'Taube.' These types were soon followed by others, the British coming in with a Handley-Page super-aeroplane with a Rolls-Royce engine of 250 h.p. Improved machines of the French were the Morane, the Scout, the remodeled Nieuport and the Spad—the latter name being derived from the initials of its sponsors—Société Pour les Appareils Deperdussin. The first Spads were fat little slug-like things, presenting scarcely any target, as they combined terrific speed with perfect ease of maneuvering. They were much used for attacking enemy dirigibles. Each pilot had eight incendiary rockets that could be loosened by pressing a button. At the opening of the Somme offensive the Spads were successfully employed against the enemy observation balloons.

Germany brought out the 200 h.p. Albatros, the 240 h.p. Halberstadt, the L.V.G., the Fokker, the Aviatik, the Roland, and a giant type of Gotha which developed great speed. The Italians constructed a number of Caproni biplanes; and the

A triplane speed scout. Span of wings 25 feet. Speed 115 miles per hour.

British added a Sopwith biplane that achieved much fame. It may be mentioned here that it was in a Sopwith that Captain de Beauchamp and Lieutenant Dancourt bombed the Krupp works at Essen—compassing a radius of 500 miles with a cargo of bombs.

The German machine most familiar to the general public, at least for the first three years of the war, was the Taube, which was evolved by the Austrian engineer Igo Etrich in collaboration with Wels, his colleague. Their first practical machine was built in 1908, and some idea of the perfection of its design may be gathered from the fact that the Taube of 1916 and 1917 was substantially identical with the early model. The design of the machine follows very closely the lines of a bird in flight—hence its name, 'Taube,' or 'dove.' The likeness to a bird is emphasized in the ribs of the frame, which resemble a bird's feathers. The supporting plane is shaped in the manner of a bird's extended wing, and is tipped up at the rear ends to secure stability. The tail is also bird-like. It is extremely sensitive to its rudder, is very sharp in turning, and is a first-class craft for reconnoitering duty. The latest machines are fitted with motors developing 120 to 150 horse power. Other German machines which won fame in the military service are the Gotha and the Albatros. The former is a monoplane, with the Etrich bird-wing feature retained. The latter is a biplane, heavy and somewhat slow, but of great endurance.

At the beginning of the war the French possessed a great number and variety of aeroplanes. This aerial fleet was divided into squadrons, called 'escadrilles,' each of which comprised six machines and pilots. After a time the government frowned upon the employment of the Blériot, Deperdussin, Nieuport and R.E.P. monoplanes. Those receiving official sanction included the Maurice Farman, Voisin, Morane-Saulnier and one or two others. The Morane-Saulnier is a biplane of great speed and has been used for aggressive work. It is the French mosquito craft of the air. The Caudron, another machine approved by the French authorities, had the faculty of being able to climb at the rate of 330 feet per minute.

The backbone of the British aerial fleet was the Royal Aerial Factory, which not only engaged in the manufacture of machines and the development of aircraft for special duties, but also carried out the inspection and testing of machines built by private firms. Three types of machines were manufactured by the Royal Aerial: first, the scouting plane, built for speed; second, a tractor carrying a pilot and an observer, with a maximum speed of 40 to 50 miles an hour, fitted with an automatic gun; third, the essentially fighting machine, with the propeller at the rear, a Lewis gun fixed in front with the marksman immediately behind it—probably one of the safest of the battleplanes.

The Allied fighting planes were of two classes, one of which operated over the home lines in a defensive manner, while the other swept out over the enemy lines, protecting the home 'work' machines and giving battle to enemy pilots. These 'work' machines were made up of units of one or other of the following: scouting groups, artillery observation groups, aerial photography groups, bombing raid groups and infantry contact groups.

Machine guns have been used by aviators not only against opponents in the air but against troops in the field. This has of course happened rarely, but there are instances where airmen, evading enemy aeroplanes and anti-aircraft guns, have swooped down within easy range of enemy troops and demoralized them by machine-gun fire. In the early days of the war, duels in the lower air were of frequent occurrence. Later, with improvements in construction, these duels in the lower air between two pilots became battles between squadrons of fast fighting machines, whirling against each other from 10,000 to 15,000 feet above the trenches, with their machine guns flashing. The newest type of light machine gun is a variation of the French 'Soixante-quinze,' and fires a projectile that can penetrate the defensive armor of any aeroplane at 1000 yards range.

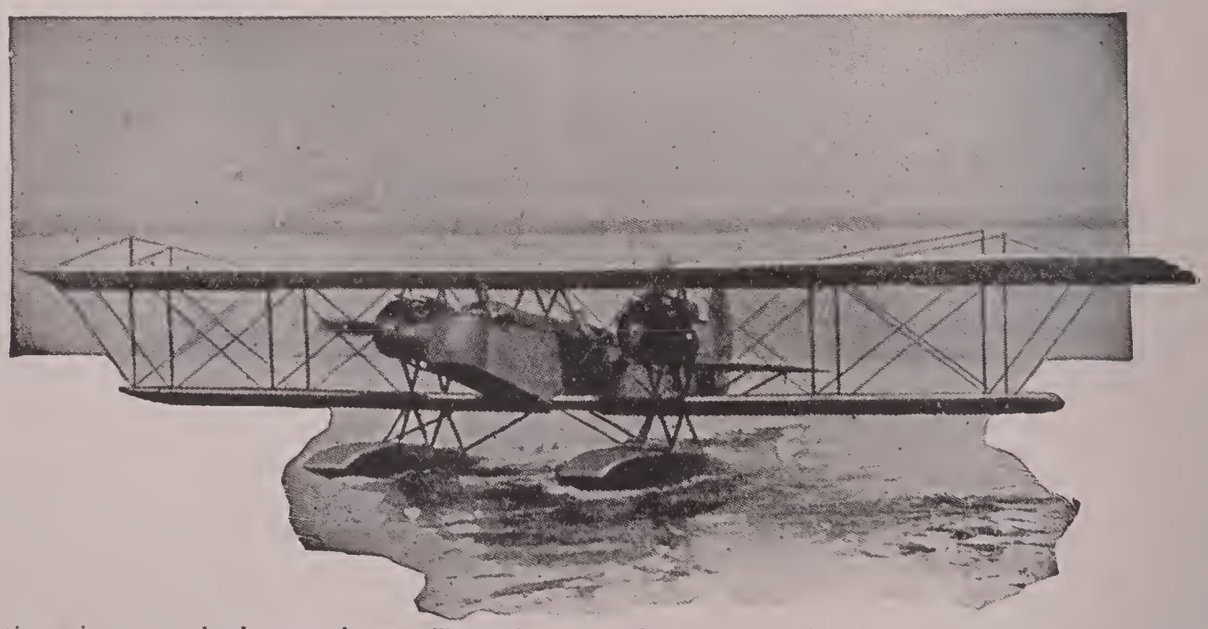
The work of the reconnaissance aviator is difficult, for not only has he to contend with the enemy air fighters but if he flies too low he comes under fire of the anti-aircraft guns. Photographs, however, can be made from an altitude of 6000 feet with the aid of a phototopographic camera, an invention of Captain Scheimpflug of Vienna, which from that height gives a clear view of 32 square miles of country. Cameras fitted with telescopic lenses and motion-picture cameras are also employed by observers. The difficulty of communicating with the earth has been overcome by wireless telegraphy.

The use of wireless is attended with difficulty on aeroplanes, though it is successfully employed on Zeppelins and other dirigible balloons. Some aeroplanes have wireless aerials permanently fitted, but a more satisfactory method, though one which has its disadvantages, is that of employing a trailing wire as an antenna, the fuselage and metallic parts forming the counterpoise. The noise of the motor makes it difficult to receive wireless messages, but an invention of Signor Marconi's is said to overcome this. The low-flying, directing airmen, known as 'contact patrols,' employed by the Allies in the Battle of the Somme, were supplied with Marconi's new wireless apparatus, which enabled them to receive as well as transmit messages.

Seaplanes. With the success achieved by the aeroplane, inventors began to consider the possibility of combining the aircraft with the boat, for use on the sea. Hugo Matullath of New York seems to have been the first to suggest this, but beyond filing his specifications nothing was done to put his ideas into practical effect. The invention of the hydroaeroplane is due to Glenn Curtiss who, in 1908, fixed floats to his aeroplane as safety devices, and Fabre, who added the floats as an integral part of the machine with the express idea of rising from the sea.

Gliders. The practicability of the glider, or motorless airplane, was demonstrated in France and Germany in 1922. Dr. George H. Madelung, designer of the Hanover glider, broke all records by staying in the air for more than three hours.

Transatlantic Flights. The honor of being the first to cross the Atlantic Ocean by the air route fell to the American tractor biplane, NC-4, which was equipped with four Liberty motors, each of 400 horse power. It had a wing span of 126 feet, a hull length of 50 feet, a gasoline capacity of 2000 gallons and an average



Curtis twin-motor hydroaeroplane. Two eight-cylinder motors of 100 horse-power each give this battleplane a speed of 85 miles per hour. It can be fitted with wheels and landing gear for field use.

speed of 80 miles an hour. Its commanding officer was Lieut.-Com. A. C. Read, U. S. N., and it was manned with five other officers of the U. S. Navy. The NC-4 and its sister planes, NC-1 and NC-3, flew from Rockaway Beach, N. Y., to Halifax, N. S., on May 7, 1919. On May 16 they started for the Azores. The NC-1 and NC-3 were so badly damaged when they reached the Azores that they were unable to continue the voyage. The NC-4 reached the harbor of Horta safely, and resumed its voyage on the morning of May 27, reaching Lisbon, Portugal, that night. The first non-stop flight was made June 14-15 by Captain John Alcock and Lieut. Arthur W. Brown in a British Vimy-Vickers plane in 16 hours and 12 minutes. The first dirigible to fly over the Atlantic was the British rigid airship R-34, on July 2-6, 1919. The return trip to England was made in 74 hours.

Aerostatic Press, a simple contrivance for rendering the pressure of the atmosphere available for extracting the coloring matter from dye-woods and similar purposes. A horizontal partition divides the machine into two parts. The lower part is connected with an air-pump, by means of which the air can be withdrawn from it. The matter from which the substance is to be extracted is laid upon the partition, which is perforated, and a perforated cover is placed over it and the air extracted from the lower vessel.

Aerostatics (ā-er-ō-stat′iks), that branch of physics which treats of the weight, pressure, and equilibrium of air and gases. See *Air*, *Air-pump*, *Barometer*, *Gas*, etc.

Aerotherapeutics (ā-er-ō-ther-a-pū′-tiks), a mode of treating disease by varying the pressure or modifying the composition of the air surrounding the patient.

Æschines (es′ki-nēz), a celebrated Athenian orator, the rival and opponent of Demosthenes, was born 390 B. C. and died in 314. He headed the Macedonian party in Greece.

Æschylus (ės′ki-lus), the first in time of the three great tragic poets of Greece, born at Eleusis. in Attica, B. C. 525, died in Sicily 456. Before he gained distinction as a dramatist he had highly distinguished himself at the battle of Marathon (490), as he afterwards did at Artemisium, Salamis, and Platæa. He first gained the prize for tragedy in B. C. 484. *The Persians*, the earliest of his extant pieces, formed part of a trilogy which gained the prize in B. C. 472. In B. C. 468 he was defeated by Sophocles, and then is said to have gone to the court of Hiero, King of Syracuse. Altogether he is reputed to have composed seventy tragedies and gained thirteen triumphs. Only seven of his tragedies are extant: *The Persians*, *Seven against Thebes*, *Suppliants*, *Prometheus*, *Agamemnon*, *Choephoræ*, and *Eumenides*, the last three forming a trilogy on the story of Orestes, presented in B. C. 458. Æschylus may be called the creator of Greek tragedy, both from the splendor of his dramatic writings and from the scenic improvements and accessories he introduced. Till his time only one actor had appeared on the stage at a time, and by bringing on a second he was really the founder of dramatic dialogue. His style was grand, daring, and full of energy, though sometimes erring in excessive splendor of diction and imagery, if not indeed harsh or turgid. His plays have little or no plot, and his characters are drawn by a few powerful strokes. There are English poetical translations of his plays by Blackie, Plumptre, and Swanwick.

Æsculapius (es-kū-lā′pi-us), the god of medicine among the Greeks, subsequently adopted by the Romans, and usually said to have been a son of Apollo. He was worshiped in particular at Epidaurus, in Peloponnesus, where a temple with a grove was dedicated to him. The sick who visited his temple had to spend one or more nights in the sanctuary, after which the remedies to be used were revealed in a dream. Those who were cured offered a sacrifice to Æsculapius, commonly a cock. He is often represented with a large beard, holding a knotty staff, round which is entwined a serpent, the serpent being specially his symbol. Near him often stands a cock. Sometimes Æsculapius is represented under the image of a serpent only.

Æsculus (es′kū-lus), the genus of plants to which belongs the horse-chestnut.

Æsop (ē′sop), the Greek fabulist, is said to have been a contemporary of Crœsus and Solon, and thus probably lived about the middle of the sixth century B. C. But so little is known of his life that his existence has been called in question. He is said to have been originally a slave, and to have received his freedom from a Samian master, Iadmon. He then visited the court of Crœsus, and is also said to have visited Pisistratus at Athens. Finally he was sent by Crœsus to Delphi to distribute a sum of money to each of the citizens. For some reason he refused to distribute the money, whereupon the Delphians, enraged, threw him from a precipice, and killed him. No works of Æsop are extant, and it is

doubtful whether he wrote any. Bentley inclined to the supposition that his fables were delivered orally and perpetuated by repetition. Such fables are spoken of both by Aristophanes and Plato. Phædrus turned into Latin verse the Æsopian fables current in his day, with additions of his own. In modern times several collections purporting to be Æsop's fables have been published.

Æsthetics (es-thet'iks; pertaining to perception), the philosophy of the beautiful; the name given to the branch of philosophy or of science which is concerned with that class of emotions, or with those attributes, real or apparent, of objects generally comprehended under the term *beauty*, and other related expressions. The term æsthetics first received this application from Baumgarten (1714–1762), a German philosopher, who was the first modern writer to treat systematically on the subject, though the beautiful had received attention at the hands of philosophers from early times. Socrates, according to Xenophon, regarded the beautiful as coincident with the good, and both as resolvable into the useful. Plato, in accordance with his idealistic theory, held the existence of an absolute beauty, which is the ground of beauty in all things. He also asserted the intimate union of the good, the beautiful, and the true. Aristotle treated of the subject in much more detail than Plato, but chiefly from the scientific or critical point of view. In his treatises on poetry and rhetoric he lays down a theory of art, and establishes principles of beauty. His philosophical views were in many respects opposed to those of Plato. He does not admit an absolute conception of the beautiful; but he distinguishes beauty from the good, the useful, the fit, and the necessary. He resolves beauty into certain elements, as order, symmetry, definiteness. A distinction of beauty, according to him, is the absence of desire in the pleasure it excites. Baumgarten's treatment of æsthetics is essentially Platonic. He made the division of philosophy into logic, ethics, and æsthetics; the first dealing with knowledge, the second with action (will and desire), the third with beauty. He limits æsthetics to the conceptions derived from the senses, and makes them consist in confused or obscured conceptions, in contradistinction to logical knowledge, which consists in clear conceptions. Kant defines beauty in reference to his four categories, quantity, quality, relation, and modality. In accordance with the subjective character of his system he denies an absolute conception of beauty, but his detailed treatment of the subject is inconsistent with the denial. Thus he attributes a beauty to single colors and tones, not on any plea of complexity, but on the ground of purity. He holds also that the highest meaning of beauty is to symbolize moral good, and arbitrarily attaches moral characters to the seven primary colors. The value of art is mediate, and the beauty of art is inferior to that of nature. Other German philosophers have dealt with this subject, their speculations going far beyond the conceptions of English writers. Shaftesbury adopted the notion that beauty is perceived by a special internal sense; in which he was followed by Hutcheson, who held that beauty existed only in the perceiving mind, and not in the object. Numerous English writers, among whom the principal are Alison and Jeffrey, have supported the theory that the source of beauty is to be found in association—a theory analogous to that which places morality in sympathy. Dugald Stewart attempted to show that there is no common quality in the beautiful beyond that of producing a certain refined pleasure; and Bain agrees with this criticism, but endeavors to restrict the beautiful within a group of emotions chiefly excited by association or combination of simpler elementary feelings. Herbert Spencer has a theory of beauty which is subservient to the theory of evolution. He makes beauty consist in the play of the higher powers of perception and emotion, defined as an activity not directly subservient to any processes conducive to life, but being gratifications sought for themselves alone. He classifies æsthetic pleasures according to the complexity of the emotions excited, or the number of powers duly exercised; and he attributes the depth and apparent vagueness of musical emotions to associations with vocal tones built up during vast ages. Among numerous writers who have made valuable contributions to the scientific discussion of æsthetics may be mentioned Winckelmann, Lessing, Richter, the Schlegels, Gervinus, Helmholtz, and Ruskin.

Æstivation (es-ti-vā'shun), a botanical term applied to the arrangement of the parts of a flower in the flower-bud previous to the opening of the bud.—The term is also applied to the summer sleep of animals. See *Dormant State*.

Ætheling. See *Atheling*.

Æ'ther. See *Ether*.

Æthio'pia. See *Ethiopia*.

Æthrioscope (eth'ri-ō-scōp, Gr. *aithrios*, clear, cloudless), an instrument for measuring radiation towards a clear sky, consisting of a metallic cup with a highly-polished interior of paraboloid shape, in the focus of which is placed one bulb of a differential thermometer, the other being outside. The inside bulb at once begins to radiate heat when exposed to a clear sky, and the extent to which this takes place is shown by the scale of the thermometer. The æthrioscope also indicates the presence of invisible aqueous vapor in the atmosphere, radiation being less than when the air is dry.

Æthu'sa, a genus of umbelliferous plants. See *Fool's Parsley.*

Aetius (a-ē'she-us), a general of the western Roman Empire, born A. D. 396; murdered 454. As commander in the reign of Valentinian III he defended the empire against the Huns, Visigoths, Franks, Burgundians, etc., completely defeating the first in particular under Attila in a great battle at Châlons in 451. For twenty years he was at the head of public affairs, and latterly was murdered by Valentinian from jealousy of his power.

Æt'na. See *Etna.*

Ætolia (ē-to'li-a), a western division of northern Greece, separated on the west by the Achelous from Acarnania and washed by the Corinthian Gulf on the south. The inhabitants are little heard of in Greek history till the Peloponnesian war, at which time they were notorious among the Greeks for the rudeness of their manners. Ætolia, in conjunction with Acarnania, now forms a nomarchy of the kingdom of Greece.

Affidavit (af-i-dā'vit), a written statement of facts upon oath or affirmation. Affidavits are generally made use of when evidence is to be laid before a judge or a court, while evidence brought before a jury is delivered orally. The person making the affidavit signs his name at the bottom of it, and swears that the statements contained in it are true. The affidavit may be sworn to in open court, or before a magistrate, notary public or other duly qualified person.

Affinity (a-fin'i-ti), in chemistry, the force by which unlike kinds of matter combine so intimately that the properties of the constituents are lost, and a compound with new properties is produced. Of the force itself we know little or nothing. It is not the same under all conditions, being very much modified by circumstances, especially temperature. The usual effect of increase of temperature is to diminish affinity and ultimately to cause the separation of a compound into its constituents; and there is probably for every compound a temperature above which it could not exist, but would be broken up. Where two elements combine to form a compound heat is almost always evolved, and the amount evolved serves as a measure of the affinity. In order that chemical affinity may come into play it is necessary that the substances should be in contact, and usually one of them at least is a fluid or a gas. The results produced by chemical combination are endlessly varied.. Color, taste, and smell are changed, destroyed, or created; harmless constituents produce strong poisons, strong poisons produce harmless compounds.

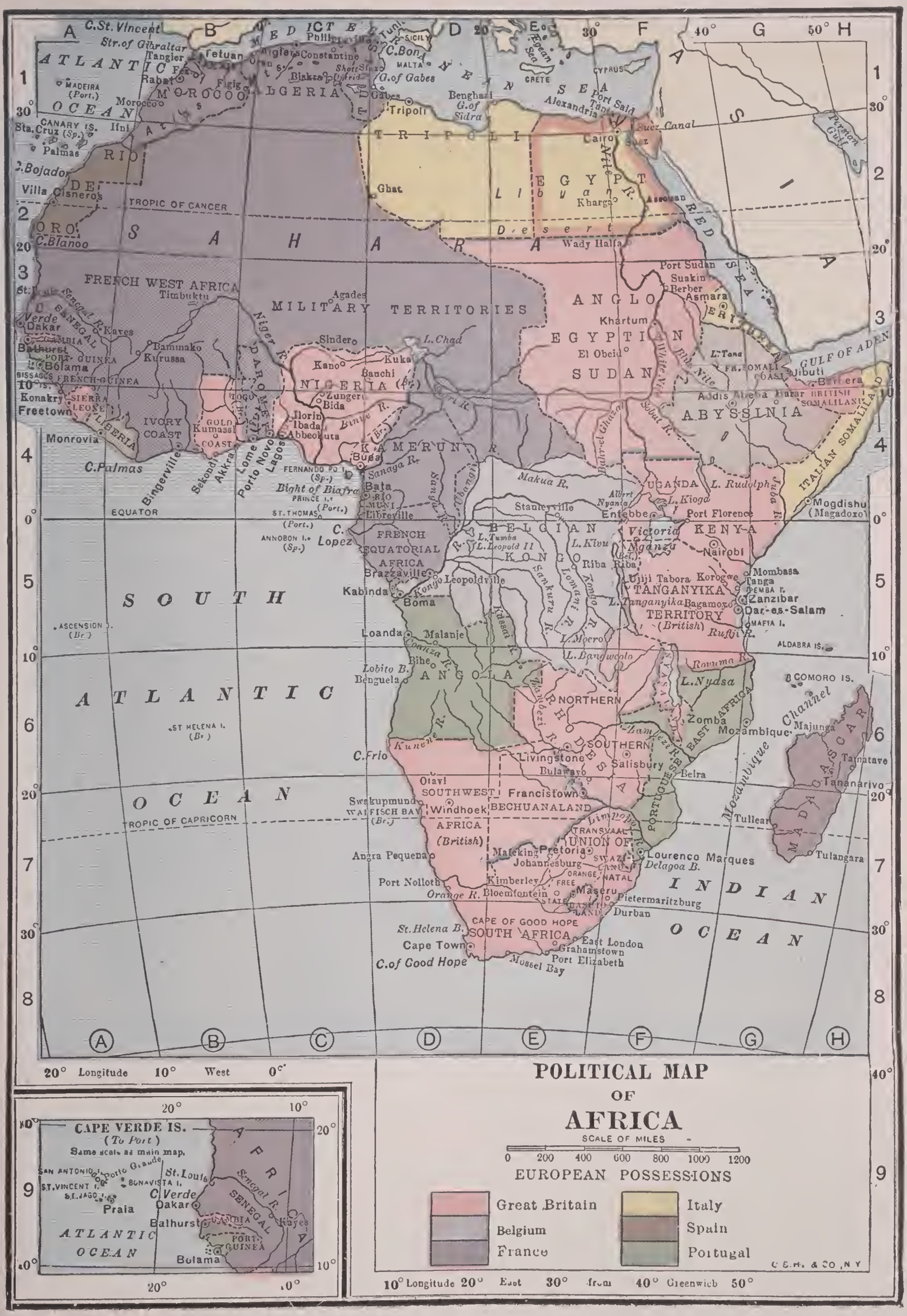
Affinity, in law, is that degree of connection which subsists between one of two married persons and the blood relations of the other. It is no real kindred (consanguinity). A person cannot, by legal succession, receive an inheritance from a relation by affinity; neither does it extend to the nearest relations of husband and wife so as to create a mutual relation between them. The degrees of affinity are computed in the same way as those of consanguinity or blood.

Affirmation (af-er-mā'shun), a solemn declaration by Quakers and others, who object to taking an oath, in confirmation of their testimony in courts of law, or of their statements on other occasions on which the sanction of an oath is required of other persons. In England the form for Quakers is, 'I do solemnly, sincerely, and truly declare and affirm.' Affirmation is generally allowed to be substituted for an oath in all cases where a person refuses to take an oath from conscientious motives, if the judge is satisfied that the motives are conscientious. False affirmation is subjected to the same penalties as perjury.

Afghanistan (åf-gan-i-stän'), the land of the Afghans, a country in Asia bounded on the east by Kashmir and the Punjab, on the south by Beluchistan, on the west by the Persian province of Khorasan, and on the north by Bokhara and Russian Turkestan. In part the boundaries are not well defined, but recently that from the Oxus to the Persian frontier has been surveyed and marked by boundary stones by a joint Russian and British commission. The area may be set down at about 245,000 sq. miles. The population is estimated at about 6,380,000. Afghanistan consists chiefly of lofty, bare, uninhabited table-

lands, sandy barren plains, ranges of snow-covered mountains, offsets of the Hindu Kush or the Himalayas, and deep ravines and valleys. Many of the last are well watered and very fertile, but about four-fifths of the whole surface is rocky, mountainous, and unproductive. The surface on the northeast is covered with lofty ranges belonging to the Hindu Kush, whose heights are often 18,000 and sometimes reach perhaps 25,000 feet. The whole northeastern portion of the country has a general elevation of over 6,000 feet; but towards the southwest, in which direction the principal mountain chains of the interior run, the general elevation declines to not more than 1600 feet. In the interior the mountains sometimes reach the height of 15,000 ft. Great part of the frontier towards India consists of the Suleiman range, 12,000 feet high. There are numerous practicable avenues of communication between Afghanistan and India, among the most extensively used being the famous Khyber Pass, by which the river Cabul enters the Punjab; the Gomul Pass, also leading to the Punjab; and the Bolan Pass on the south, through which the route passes to Sind. Of the rivers the largest is the Helmund, which flows in a southwesterly direction more than 400 miles, till it enters the Hamoon or Seistan swamp. It receives the Arghandab, a considerable stream. Next in importance are the Cabul in the northeast, which drains to the Indus, and the Hari Rud in the northwest, which, like other Afghan streams, loses itself in the sand. The climate is extremely cold in the higher, and intensely hot in the lower regions, yet on the whole it is salubrious. The most common trees are pines, oaks, birch, and walnut. In the valleys fruits, in the greatest variety and abundance, grow wild. The principal crops are wheat, forming the staple food of the people; barley, rice, and maize. Other crops are tobacco, sugar-cane, and cotton. The chief domestic animals are the dromedary, the horse, ass, and mule, the ox, sheep with large fine fleeces and enormous fat tails, and goats; of wild animals there are the tiger, bear, leopard, wolf, jackal, hyena, fox, etc. The chief towns are Cabul (the capital), Kandahar, Ghuzni, and Herat. The inhabitants belong to different races, but the Afghans proper form the great mass of the people. They are allied in blood to the Persians, and are divided into a number of tribes, among which the Duranis and Ghiljis are the most important. The Afghans are bold, hardy, and warlike, fond of freedom and resolute in maintaining it, but of a restless, turbulent temper, and much given to plunder. Tribal dissensions are constantly in existence, and seldom or never do all the Afghans pay allegiance to the nominal ruler of their country. Their language is distinct from the Persian, though it contains a great number of Persian words, and is written, like the Persian, with the Arabic characters. In religion they are Mohammedans of the Sunnite sect.

The history of Afghanistan belongs almost to modern times. The collective name of the country itself is of modern and external origin (Persian). In 1738 the country was conquered by the Persians under Nadir Shah. On his death in 1747 Ahmed Shah, one of his generals, obtained the sovereignty of Afghanistan, and became the founder of a dynasty, which lasted about eighty years. At the end of that time Dost Mohammed, the ruler of Cabul, had acquired a preponderating influence in the country. On account of his dealings with the Russians the British resolved to dethrone him and restore Shah Shuja, a former ruler. In April, 1839, a British army under Sir John Keane entered Afghanistan, occupied Cabul, and placed Shah Shuja on the throne, a force of 8000 being left to support the new sovereign. Sir W. Macnaghten remained as envoy at Cabul, with Sir Alexander Burnes as assistant envoy. The Afghans soon organized a wide-spread insurrection, which came to a head on Nov. 2, 1841, when Burnes and a number of British officers, besides women and children, were murdered, Macnaghten being murdered not long after. The other British leaders now made a treaty with the Afghans, at whose head was Akbar, son of Dost Mohammed, agreeing to withdraw the forces from the country, while the Afghans were to furnish them with provisions and escort them on their way. On 6th January, 1842, the British left Cabul and began their most disastrous retreat. The cold was intense, they had almost no food—for the treacherous Afghans did not fulfil their promises—and day after day they were assailed by bodies of the enemy. By the 13th, 26,000 persons, including camp-followers, women and children, were destroyed. Some were kept as prisoners, but only one man, Dr. Brydon, reached Jelalabad, which, as well as Kandahar, was still held by British troops. In a few months General Pollock, with a fresh army from India, retook Cabul and soon finished the war. Shah Shuja having been assassinated, Dost Mohammed again obtained the throne of Cabul, and acquired extensive power in Afghanistan. He joined with the Sikhs against the British, but after


POLITICAL MAP
OF
AFRICA
SCALE OF MILES
0 200 400 600 800 1000 1200
EUROPEAN POSSESSIONS
Great Britain
Belgium
France
Italy
Spain
Portugal
C.S.H. & CO., N.Y.
20° Longitude 10° West 0°
10° Longitude 20° East 30° from 40° Greenwich 50°
ATLANTIC OCEAN
INDIAN OCEAN
SAHARA
SOUTH
MEDITERRANEAN SEA
RED SEA
GULF OF ADEN
TROPIC OF CANCER
TROPIC OF CAPRICORN
EQUATOR
MOROCCO
ALGERIA
TRIPOLI
EGYPT
Libyan Desert
FRENCH WEST AFRICA
MILITARY TERRITORIES
ANGLO EGYPTIAN SUDAN
ABYSSINIA
ERITREA
BRITISH SOMALILAND
ITALIAN SOMALILAND
NIGERIA
KAMERUN
FRENCH EQUATORIAL AFRICA
BELGIAN KONGO
UGANDA
KENYA
TANGANYIKA TERRITORY (British)
ANGOLA
NORTHERN RHODESIA
SOUTHERN RHODESIA
SOUTHWEST AFRICA (British)
BECHUANALAND
UNION OF SOUTH AFRICA
PORTUGUESE EAST AFRICA
MADAGASCAR
CAPE VERDE IS. (To Port)
Same scale as main map.
Praia
Dakar
Bathurst
Bolama
Kayes
St. Louis
Porto Grande
ATLANTIC OCEAN
AFRICA
SENEGAL
GAMBIA
PORT. GUINEA
20° 10°

wards made an offensive and defensive alliance with the latter. He died in 1863, having nominated his son Shere Ali his successor. Shere Ali entered into friendly relations with the British, but in 1878, having repulsed a British envoy and refused to receive a British mission (a Russian mission being meantime at his court), war was declared against him, and the British troops entered Afghanistan. They met with comparatively little resistance; the ameer fled to Turkestan, where he soon after died; and his son Yakoob Khan having succeeded him concluded a treaty with the British (at Gandamak, May, 1879), in which a certain extension of the British frontier, the control by Britain of the foreign policy of Afghanistan, and the residence of a British envoy in Cabul, were the chief stipulations. The members of the mission were again treacherously attacked and slain, and troops were again sent into the country. Cabul was once more occupied, and Kandahar and Ghazni were also relieved; while Yakoob Khan was sent to imprisonment in India. In 1880 Abdur-Rahman, a grandson of Dost Mohammed, was recognized by Britain as emir of the country, and continued on friendly terms with the British, by whom he was subsidized, until his death in 1901, his son Habibullah Khan succeeding. Encroachments by the Russians on territory claimed by Afghanistan almost brought about a rupture between Britain and Russia in 1885, and led to the delimitation of the frontier of Afghanistan on the side next the territory occupied by Russia. On February 20, 1919, the Ameer, Habibullah Khan, was assassinated. His brother, Nasrulla, seized the throne; but Amanullah Khan (born 1892), the third son of Habibullah, announced his accession, and as he had the support of the army he was acknowledged as Ameer.

Afium-Kara-Hissar ('opium-black-castle'), a city of Asiatic Turkey, 170 miles E. S. E. of Constantinople, with manufactures of woolens, and a trade in opium (*afium*), etc. Pop. 20,000.

Afragola (a-fra-gō'la), a town of Italy, about 6 miles N. N. E. of Naples, has extensive manufactures of straw bonnets. Pop. 22,000.

Afranius, LUCIUS (a-frā'ni-us), a Roman comic dramatist who flourished about the beginning of the first century B.C., and of whose writings only fragments remain.

Africa (af'ri-ka), one of the three great divisions of the Old World, and the second in extent of the five principal continents of the globe, forming a vast peninsula joined to Asia by the Isthmus of Suez. It is of a compact form, with few important projections or indentations, and has therefore a very small extent of coast-line (about 16,000 miles, or much less than that of Europe) in proportion to its area. This continent extends from 37° 20′ N. lat. to 34° 50′ S. lat., and the extreme points, Cape Blanco and Cape Agulhas, are nearly 5000 miles apart. From west to east, between Cape Verde, lon. 17° 34′ W. and Cape Guardafui, lon. 51° 16′ E., the distance is about 4600 miles. The area is estimated at 11,500,000 square miles, or more than three times that of Europe. The islands belonging to Africa are not numerous, and, except Madagascar, none of them are large. They include Madeira, the Canaries, Cape Verde Islands, Fernando Po, Prince's Island, St. Thomas, Ascension, St. Helena, Mauritius, Bourbon, the Comoros, Socotra, etc.

The interior of Africa has recently been so well explored that its surface characteristics are known. One of these is that almost all round it at no great distance from the sea, and, roughly speaking, parallel with the coast-line, we find ranges of mountains or elevated lands forming the outer edges of interior plateaux. The most striking feature of Northern Africa is the immense tract known as the Sahara or Great Desert, which is inclosed on the north by the Atlas Mountains (greatest height, 12,000 to 13,000 feet), the plateau of Barbary and that of Barca, on the east by the mountains along the west coast of the Red Sea, on the west by the Atlantic Ocean, and on the south by the Soudan. The Sahara is by no means the sea of sand it has sometimes been represented: it contains elevated plateaux and even mountains radiating in all directions, with habitable valleys between. A considerable nomadic population is scattered over the habitable parts, and in the more favored regions there are settled communities. The Soudan, which lies to the south of the Sahara, and separates it from the more elevated plateau of Southern Africa, forms a belt of pastoral country across Africa, and includes the countries on the Niger, around Lake Tchad (or Chad), and eastwards to the elevated region of Abyssinia. Southern Africa as a whole is much more fertile and well watered than Northern Africa, though it also has a desert tract of considerable extent (the Kalahari Desert). This division of the continent consists of a table-land, or series of table-lands, of considerable elevation and great diversity

of surface, exhibiting hollows filled with great lakes, and terraces over which the rivers break in falls and rapids, as they find their way to the low-lying coast tracts. The mountains which inclose Southern Africa are mostly much higher on the east than on the west, the most northerly of the former being those of Abyssinia, with heights of 10,000 to 14,000 or 16,000 feet, while the eastern edge of the Abyssinian plateau presents a steep unbroken line of 7000 feet in height for many hundred miles. Farther south, and between the great lakes and the Indian Ocean, we find Mounts Kenia and Kilimanjaro (19,500 ft.), the loftiest in Africa, covered with perpetual snow. Of the continuation of this mountain boundary we shall only mention the Drakenberg Mountains, which stretch to the southern extremity of the continent, reaching in Cathkin Peak, Natal, the height of over 10,000 feet. Of the mountains that form the western border the highest are the Cameroon Mountains, which rise to a height of 13,000 feet, at the inner angle of the Gulf of Guinea. The average elevation of the southern plateau is probably from 3000 to 4000 feet.

The Nile is the only great river of Africa which flows to the Mediterranean. It receives its waters primarily from the great lake Victoria Nyanza, which lies under the equator, and in its upper course is fed by tributary streams of great size, but for the last 1200 miles of its course it has not a single affluent. It drains an area of more than 1,000,000 square miles. The Indian Ocean receives numerous rivers; but the only great river of South Africa which enters that ocean is the Zambesi, the fourth in size of the continent, and having in its course the Victoria Falls, one of the greatest waterfalls in the world. In Southern Africa also, but flowing westward and entering the Atlantic, is the Congo, which takes origin from a series of lakes and marshes in the interior, is fed by great tributaries, and is the first in volume of all the African rivers, carrying to the ocean more water than the Mississippi. Unlike most of the African rivers, the mouth of the Congo forms an estuary. Of the other Atlantic rivers, the Senegal, the Gambia, and the Niger are the largest, the last, which traverses the western Soudan, being third among African streams.

With the exception of Lake Tchad there are no great lakes in the northern division of Africa, whereas in the number and magnificence of its lakes the southern division almost rivals North America. Here are the Victoria and Albert Nyanza, Lakes Tanganyika, Nyassa, Shirwa, Bangweolo, Moero, and others. Of these the Victoria and Albert belong to the basin of the Nile; Tanganyika, Bangweolo, and Moero to that of the Congo; Nyassa, by its affluent the Shiré, to the Zambesi. Lake Tchad on the borders of the northern desert region, and Lake Ngami on the borders of the southern, have a remarkable resemblance in position, and in the fact that both are drained by streams that lose themselves in the sand. The climate of Africa is mainly influenced by the fact that it lies almost entirely within the tropics. In the equatorial belt, both north and south, rain is abundant and vegetation very luxuriant, dense tropical forests prevailing for about 10° on either side of the line. To the north and south of the equatorial belt the rainfall diminishes, and the forest region is succeeded by an open pastoral and agricultural country. This is followed by the rainless regions of the Sahara on the north and the Kalahari Desert on the south, extending beyond the tropics, and bordering on the agricultural and pastoral countries of the north and south coasts, which lie entirely in the temperate zone. The low coast regions of Africa are almost everywhere unhealthy, the Atlantic coast within the tropics being the most fatal region to Europeans.

Among mineral productions may be mentioned gold, which is found in the rivers of West Africa (hence the name Gold Coast), and in Southern Africa latterly in much abundance; diamonds have been found in large numbers in recent years in the south; iron, copper, lead, tin, and coal are also found.—Among plants are the baobab, the date-palm (important as a food plant in the north), the doum-palm, the oil-palm, the wax-palm, the shea-butter tree, trees yielding caoutchouc, the papyrus, the castor-oil plant, indigo, the coffee-plant, heaths with beautiful flowers, aloes, etc. Among cultivated plants are wheat, maize, millet, and other grains, cotton, coffee, cassava, ground-nut, yam, banana, tobacco, various fruits, etc. As regards both plants and animals, northern Africa, adjoining the Mediterranean, is distinguished from the rest of Africa in its great agreement with southern Europe.—Among the most characteristic African animals are the lion, hyena, jackal, gorilla, chimpanzee, baboon, African elephant (never domesticated, yielding much ivory to trade), hippopotamus, rhinoceros, giraffe, zebra. quagga, antelopes in great variety and immense numbers.—Among birds are the ostrich, the secretary-bird or serpent-eater, the honey-guide, cuckoo, sacred ibis,

guinea fowl.—The reptiles include the crocodile, chameleon, and serpents of various kinds, some of them very venomous. Among insects are locusts, scorpions, the tsetse-fly whose bite is fatal to cattle, and to which is attributed the deadly sleeping sickness, and white ants.

The great races of which the population of Africa mainly consists are the Hamites, the Semites, the Negroes, and the Bantus. To the Semitic stock belong the Arabs, who form a considerable portion of the population in Egypt and along the north coast, while a portion of the inhabitants of Abyssinia are of the same race (though the blood is considerably mixed). The Hamites are represented by the Copts of Egypt, the Berbers, Kabyles, etc., of Northern Africa, and the Somâli, Danâkil, etc., of East Africa. The Negro races occupy a vast territory in the Soudan and Central Africa, while the Bantus occupy the greater part of Southern Africa from a short distance north of the equator, and include the Kaffres, Bechuanas, Swahili, and allied races. In the extreme southwest are the Hottentots and Bushmen (the latter a dwarfish race). In the central forests is a race of dwarfs, usually known as Pygmies. In Madagascar there is a large Malay element. To these may be added the Fulahs on the Niger and the Nubians on the Nile and elsewhere, who are of a brownish color, and are often regarded as distinct from the other races, though sometimes classed with the Negroes. In religion a great proportion of the inhabitants are heathens of the lowest type; Mohammedanism possesses a large number of adherents in North Africa, and is rapidly spreading in the Soudan; Christianity prevails only among the Copts, the Abyssinians, and the natives of Madagascar, the latter having been converted in recent times. Elsewhere the missionaries seem to have made but little progress. Over great part of the continent civilization is at a low ebb, yet in some parts the natives have shown considerable skill in agriculture and various mechanical arts, as in weaving and metal working. Of African trade two features are the caravans that traverse great distances, and the trade in slaves that has long prevailed but has now been almost wholly brought to an end. Among articles exported from Africa are palm-oil, diamonds, ivory, ostrich feathers, wool, cotton, esparto, caoutchouc, etc. The total population is estimated at 170,000,000. Of these a small number are of European origin—French in Algeria, British and Dutch at the south, and growing numbers of Europeans in East and West Africa.

Practically the only independent states are the kingdom of Abyssinia (Ethiopia) and the negro republic of Liberia. The rest of the continent is parcelled up among the European powers. By far the larger portion is included in the British Empire, namely, British East Africa, including the East African Protectorate, Tanganyika Territory (formerly German East Africa), Uganda and Zanzibar; Nyasaland; part of Somali; South Africa, including Basutoland, Bechuanaland, Rhodesia, Southwest Africa (formerly German Southwest Africa), Union of South Africa; West Africa, including Nigeria, Gambia, Ashanti, etc., and part of the former German colonies of Togo and Cameroon; Egypt, etc. France holds Algeria, Tunis, Senegal, much of the Sahara, Guinea, Ivory Coast, Dahomey, part of Somali, Madagascar, part of Togo and Cameroon, etc. Italy has Tripoli and Cyrenaica, Eritrea, and part of Somali. Portugal has Mozambique, Angola, Guinea, Cape Verde Islands. Spain's possessions include part of Morocco, Rio de Oro, Guinea, etc. Belgium has the Belgian Congo. The Congo Free State was founded in 1885 by Leopold II, king of the Belgians; annexed by Belgium in 1907.

The name Africa was given by the Romans at first to a small district in the immediate neighborhood of Carthage, from which it has spread to the whole continent. The Greeks called Africa Libya, and the Romans often used the same name. The first African exploring expedition on record was sent by Pharaoh Necho about the end of the seventh century B. C. to circumnavigate the continent. The navigators, who were Phœnicians, were absent three years, and according to report they accomplished their object. Fifty or a hundred years later, Hanno, a Carthaginian, made a voyage down the west coast and seems to have got as far as the Bight of Benin. The east coast was probably known to the ancients as far as Mozambique and the island of Madagascar. Of modern nations the Portuguese were the first to take in hand the exploration of Africa. In 1433 they doubled Cape Bojador, in 1441 reached Cape Blanco, in 1442 Cape Verde, in 1462 they discovered Sierra Leone. In 1484 the Portuguese Diego Cam discovered the mouth of the Congo. In 1486 Bartholomew Diaz rounded the Cape of Good Hope and reached Algoa Bay. A few years later a Portuguese traveler visited Abyssinia. In 1497 Vasco da Gama, who was commissioned to find a route by sea to India, sailed round the southern extremity as far as

Zanzibar, discovering Natal on his way. The first European settlements were those of the Portuguese in Angola and Mozambique, soon after 1500. In 1650 the Dutch made a settlement at the Cape. In 1770 James Bruce reached the source of the Blue Nile in Abyssinia. For the exploration of the interior of Africa, however, little was done until the nineteenth century.

Modern African exploration may be said to begin with Mungo Park, who reached the upper course of the Niger (1795–1805). Dr. Lacerda, a Portuguese, about the same time reached the capital of the Cazembe, in the center of South Africa, where he died. In 1802–6 two Portuguese traders crossed the continent from Angola, through the Cazembe's dominions, to the Portuguese possessions on the Zambesi. In 1822–24 extensive explorations were made in Northern and Western Africa by Denham, Clapperton, and Oudney, who proceeded from Tripoli by Murzuk to Lake Tchad, and explored the adjacent regions; Laing, in 1826, crossed the desert from Tripoli to Timbuctoo; Caillié, leaving Senegal, made in 1827–28 a journey to Timbuctoo, and thence through the desert to Morocco. In 1830 Lander traced a large part of the course of the Niger downward to its mouth, discovering its tributary, the Benue. In the south Livingstone, who was stationed as a missionary at Kolobeng, set out from that place in 1849 and discovered Lake Ngami. In 1851 he went north again, and came upon numerous rivers flowing north, affluents of the Zambesi. In 1848 and 1849 Krapf and Rebmann, missionaries in East Africa, discovered the mountains Kilimanjaro and Kenia. An expedition sent out by the British government started from Tripoli in 1850 to visit the Sahara and the regions around Lake Tchad, the chiefs being Richardson, Overweg, and Barth. The last returned alone in 1855, having carried his explorations over 2,000,000 sq. miles of this part of Africa, hitherto almost unknown. In 1853–56 Livingstone made an important series of explorations. He first went northwestwards, tracing part of the Upper Zambesi, and reached St. Paul de Loanda on the west coast in 1854. On his return journey he followed somewhat nearly the same route till he reached the Zambesi, and proceeding down the river, and visiting its falls, called by him the Victoria Falls, he arrived at Quilimane at its mouth on 20th May, 1856, thus crossing the continent from sea to sea. In 1858 he resumed his exploration of the Zambesi regions, and in various journeys visited Lakes Shirwa and Nyassa, sailed up the Shire to the latter lake, and established the general features of the geography of this part of Africa, returning to England in 1864. By this time the great lakes of equatorial Africa were becoming known, Tanganyika and Victoria having been discovered by Burton and Speke in 1858, and the latter having been visited by Speke and Grant in 1862 and found to give rise to the Nile, while the Albert Nyanza was discovered by Baker in 1864. In 1866 Livingstone entered on his last great series of explorations, the main object of which was to settle the position of the watersheds in the interior of the continent, and which he carried on till his death in 1873. His most important explorations on this occasion were west and southwest of Tanganyika, including the discovery of Lakes Bangweolo and Moero, and part of the upper course of the river Congo (here called Lualaba). For over two years he was lost to the knowledge of Europe till met with by H. M. Stanley (who had been sent to seek him) at Tanganyika in 1871. Gerhard Rohlfs, in a succession of journeys from 1861 to 1874, traversed the Sahara in various directions, and crossed the continent from Tripoli to Lagos by way of Murzuk, Bornu, etc. In 1873–75 Lieut. Cameron, reached and surveyed Lake Tanganyika, explored the country to the west of it, and then traveled to the southwest, finally reaching Benguela on the Atlantic coast. In 1874–77 Stanley went westward from Zanzibar to where Livingstone had struck the Congo and followed the river down to its mouth, thus finally tracing its course and completing a remarkable and valuable series of explorations. In 1879 Serpa Pinto completed a journey across the continent from Benguela to Natal, and in 1881–82 Wissman and Pogge crossed it again from St. Paul de Loanda to Zanzibar. In 1887–89 Stanley, sent to the rescue of Emin Bey, traversed the great equatorial forest, and crossed the continent by a new route. This period of discovery was followed by a period of partition, in which England and France were especially active, dividing the choicest portions of the continent between them with the exception of the great Congo Free State, the government of which was assigned by the powers to Belgium. Germany, Italy and Spain followed until very nearly the whole continent was appropriated. Within the twentieth century an active era of development has set in. Railway building is progressing, considerable progress having been made in the building of the Cape-to-Cario railway, the European rule is grow-

ing more pronounced, and the British colonies in South Africa have combined into a federal union.

African Methodist Episcopal Church, organized in Philadelphia in 1816 withdrew from the M. E. Church to have larger privileges and more freedom of action. It has general and annual conferences, bishops, etc. It exists principally in the South and numbers about 650,000 members.

African Methodist Episcopal Zion Church, organized in New York, 1820, for its adherents to 'have an opportunity to exercise their spiritual gifts among themselves.' Lay representation is a prominent feature in its polity, and women can be ordained as preachers. It has now nearly 550,000 members.

Africander (af'ri-kan-der), a name applied to the descendants of European parents born in South Africa. As these are largely of Dutch descent, an association called the 'Africander Bund' became prominent in Cape Colony after the Transvaal War, its purpose being to extend the political influence of the Dutch population.

African Railway. A railway from Cubalo, on the Congo, to Lake Tanganyika, finished in March, 1915, completes a line of steam transportation across Africa by land and water, from the Atlantic to the Indian Ocean.

Afterdamp, the term applied to the suffocating gas, chiefly consisting of carbonic acid gas, which remains in a coal mine after an explosion of firedamp.

Afterglow, the brilliant twilight color seen in the western sky after sunset. Those seen before sunrise are called foreglows.

Agadir (ȧ-gȧ-dēr'), a seaport of Southern Morocco, founded by the Portuguese in the 16th century. In 1911 the dispatch of the German gunboat *Panther* to the port 'to protect German interests' almost led to war with France. (See *Morocco.*) Formerly an important place, its importance has declined. Pop. 1000.

Agamemnon (a-ga-mem'non), in Greek mythology, son of Atreus, King of Mycenæ in Argolis, brother of Menelaus, and commander of the allied Greeks at the siege of Troy. He was the father of Orestes, Iphigenia, and Electra, and husband of Clytemnestra, who brought about his murder.

Agamogenesis. See *Parthenogenesis, Generation,* etc.

Agaña (a-gä'nya), a town on the American island of Guam, of which it is the seat of government. It lies on the W. shore of Agaña Bay. Pop. 7500.

Aganippe (-nip'ē), a fountain on Mount Helicon, in Greece, sacred to the Muses, which had the property of inspiring with poetic fire whoever drank of it.

Agape (ag'a-pē; Gr. *agapē, love*), in ecclesiastical history, the love-feast or feast of charity, in use among the primitive Christians, when a liberal contribution was made by the rich to feed the poor. During the first three centuries love-feasts were held in the churches without scandal, but in after-times the heathen began to tax them with impurity, and they were condemned at the Council of Carthage in 397. Some modern sects, as the Wesleyans, Sandemanians, Moravians, etc., have attempted to revive this feast.

A'gar-a'gar, a dried sea-weed of the Asiatic Archipelago, the *Gracilaria lichenoides,* much used in the East for soups and jellies, and also by the paper and silk manufacturers of Eastern Asia as an ingredient in some classes of their goods. Used also as a culture medium to grow bacteria upon.

Agaric (*Agaricus*), a large and important genus of fungi, characterized by having a fleshy cap or pileus, and a number of radiating plates or gills on which are produced the naked spores. The majority of this species are furnished with stems, but some are attached to the objects on which they grow by their pileus. Many of the species are edible, like the common mushroom.

Agaric Mineral, or MOUNTAIN-MEAL, one of the purest of the native carbonates of lime, found chiefly in the clefts of rocks and at the bottom of some lakes in a loose or semi-indurated form resembling a fungus. The name is also applied to a stone of loose consistence found in Tuscany, of which bricks may be made so light as to float in water, and of which the ancients are supposed to have made their floating bricks.

Agassiz (ag'as-ē), ALEXANDER, only son of J. L. R. Agassiz, born at Neufchâtel, Switzerland, in 1835, died March 27, 1910. He became assistant and then chief curator of the Museum of Comparative Zoölogy at Harvard. In 1875 he founded the zoölogical station at Newport, R. I. He was specially distinguished for his studies in marine zoölogy, and gained wealth through copper-mining enterprises near Lake Superior.

Agassiz, JEAN LOUIS RODOLPHE, an eminent naturalist, born 1807; died 1873, son of a Swiss Protestant clergyman at Motiers, near the eastern extremity of the Lake of Neufchâtel. He completed his education at Lausanne, and early developed a love of the natural sciences. He studied medicine at Zürich, Heidelberg, and Munich. His attention was first specially directed to ichthyology by being called on to describe the collection of fishes brought to Europe from Brazil by Martius and Spix. This work was published in 1829, and was followed in 1830 by *Histoire Naturelle des Poissons d'eaux douces de l'Europe Centrale* (Freshwater Fishes of Central Europe). Directing his attention to fossil ichthyology, five volumes of his *Recherches sur les Poissons Fossiles* appeared between 1834 and 1844. His researches led him to propose a new classification of fishes, which he divided into four classes, distinguished by the characters of the skin, as ganoids, placoids, cycloids, and ctenoids. His system has not been generally adopted, but the names of his classes have been used as useful terms. In 1836 he began the study of glaciers, and in 1840 he published his *Etudes sur les Glaciers;* in 1847 his *Système Glaciaire.* From 1832 he had been professor of natural history at Neufchâtel, when in 1846 pressing solicitations and attractive offers induced him to settle in America, where he delivered a series of lectures on zoölogy, and later became connected in a teaching capacity with Harvard University. After his arrival in America he engaged in various investigations and explorations, and published numerous works, including *Principles of Zoölogy,* in connection with Dr. A. Gould (1848); *Contributions to the Natural History of the United States* (four vols., 1857–62); *Zoölogie Générale* (1854); *Methods of Study in Natural History* (1863). In 1865–66 he made zoölogical excursions and investigations in Brazil, which were productive of most valuable results. Agassiz held views on many important points in science different from those which prevailed among the scientific men of the day, and in particular he strongly opposed the evolution theory.

Agassiz (ag'a-sē), MOUNT, an extinct volcano in Arizona, 10,000 feet in height; a place of summer resort, near the Great Cañon of the Colorado.

Agate (ag'at), a siliceous, semipellucid compound mineral, consisting of bands or layers of various colors blended together, the base generally being chalcedony, and this mixed with variable proportions of jasper, amethyst, quartz, opal, heliotrope, and carnelian. The varying manner in which these materials are arranged causes the agate when polished to assume some characteristic appearances, and thus certain varieties are distinguished, as the ribbon agate, the fortification agate, the zone agate, the star agate, the moss agate, the clouded agate, etc. In Scotland they are cut and polished under the name of Scottish pebbles.

Agatharchus (ag-a-thar'kus), a noted Greek painter, native of Samos, the first to apply the rules of perspective to theatrical scene-painting; flourished about 480 B.C.

Agathias (a-gā'thi-as), a Greek poet and historian, born at Myrina, Asia Minor, about 536 A.D.; author of an anthology, a collection of love poems, and a history (553-558 A.D.), which, with all its blemishes, is a valuable chronicle of events during an eventful period of Roman history.

Agathocles (a-gath'o-klēz), a Sicilian Greek, one of the boldest adventurers of antiquity, born 361 B.C. By his ability and energy, and being entirely unscrupulous, he raised himself from the position of a potter to that of sovereign of Syracuse and master of Sicily. Wars with the Carthaginians were the chief events of his life. He died (was poisoned) at the age of seventy-two, or, as some say, ninety-five.

Agathon (ag'a-thon), or AGATHO, a Greek tragic poet, a friend of Euripides, and contemporary with Socrates and Alcibiades, born about 447 B.C.; died about 400 B.C. The dinner which he gave to celebrate his first dramatic victory was made the groundwork of Plato's *Symposium.*

Agave (a-gā'vē), a genus of plants, nat. order Amaryllidaceæ (which includes the daffodil and narcissus), popularly known as American aloes. They are generally large, and have a massive tuft of fleshy leaves with a spiny apex. They live for many years—ten to seventy according to treatment—before flowering. When this takes place the tall flowering stem springs from the center of the tuft of leaves, and grows very rapidly until it reaches a height of 15, 20, or even 40 feet, bearing in its upper portion a large number of flowers. The best-known species is *A. americana* (American century plant), introduced to Europe 1561, and now extensively grown in the warmer parts of that continent as well as in Asia (India in particular). This and other species yield various important products. The sap when fermented yields a beverage resembling cider, called by the Mexicans

pulque. The leaves are used for feeding cattle; the fibers of the leaves (sometimes called *pita* hemp or flax) are formed into

American Aloe (*Agave americāna*).

thread, cord, and ropes. (See *Sisal.*)

Agawam (ag'a-wąm), a town of Hampden county, Mass., 4 miles S.W. of Springfield, in a fertile farming region. It has manufactures of paper, woolens, etc. Pop. 5023.

Agde (ägd), a seaport of southern France, department of Hérault, with a cathedral. Pop. 9265.

Age, a period of time representing the whole or a part of the duration of any individual thing or being, but used more specifically in a variety of senses. In law *age* is applied to the periods of life when men and women are enabled to do that which before, for want of years and judgment, they could not legally do. Certain rights are acquired in various countries at fixed periods of age, full legal age in English-speaking countries being twenty-one years, which age is completed on the day preceding the anniversary of a person's birth, who till that time is an infant, and is so styled in law. At full age (twenty-one years) citizens in the United States can vote, and can hold office except in certain special cases, such as a representative in Congress, who must be at least twenty-five years of age, a senator, thirty years, and the President, thirty-five years. The military age is from eighteen to forty-five years.

The term is also applied to designate the successive epochs or stages of civilization in history or mythology. Hesiod speaks of five distinct ages:—1. *The golden* or *Saturnian age*, a patriarchal and peaceful age. 2. The *silver age*, licentious and wicked. 3. The *brazen age*, violent, savage, and warlike. 4. The *heroic age*, which seemed an approximation to a better state of things. 5. The *iron age*, when justice and honor had left the earth. The term is also used in such expressions as the *dark ages*, the *middle ages*, the *Elizabethan age*, etc.

The *Archæological Ages* or *Periods* are three—the Stone Age, the Bronze Age, and the Iron Age, these names being given in accordance with the materials chiefly employed for weapons, implements, etc., during the particular period. The Stone Age of Europe has been subdivided into two—the Palæolithic or earlier, and Neolithic or later. The word *age* in this sense has no reference to the lapse of time, but simply denotes the stage at which a people has arrived in its progress towards civilization; thus there are races still in their stone age.

Agen (ä-zhaṇ), one of the oldest towns in France, capital of dep. Lot-et-Garonne, on the Garonne, 74 miles southeast of Bordeaux; see of a bishop; manufactures sailcloth, woolens and linens, etc., and has an extensive trade. Pop. (1906) 18,640.

Agent (ā'jent), a person appointed by another to act for or perform any kind of business for him, the latter being called in relation to the former the *principal*. An agent may be general or special. The acts of a general agent bind his principal, although the agent may violate his private instructions. An agent, without special authority, cannot appoint another person in his stead.

Ageratum (ag-er-ā'tum), a genus of composite plants of the warmer parts of America, one species of which, *A. mexicanum*, is a well-known flower-border annual with dense lavender-blue heads.

Agesilaus (a-jes-i-lā'us), a King of Sparta, born in 442 B.C., and elevated to the throne after the death of his brother, Agis II. He acquired renown by his exploits against the Persians, Thebans, and Athenians. Though a vigorous ruler, and almost adored by his soldiers, he was of small stature and lame from his birth. He died in Egypt in the winter of 361–360 B.C. Xenophon, Plutarch, and Cornelius Nepos are among his biographers.

Agglomerate (a-glom'e-rāt), in geology, a collective name

for masses consisting of angular fragments ejected from volcanoes. When the mass consists of fragments worn and rounded by water it is called a *conglomerate.*

Agglutinate Languages (a-glū′-ti-nāt), languages in which the modifying suffixes are, as it were, glued on to the root, both it and the suffixes retaining a kind of distinctive independence and individuality, as in the Turkish and other Turanian languages, and the Basque language.

Aghrim, or AUGHRIM (ą′grim), a village in the county of Galway in Ireland, memorable for a decisive victory gained in the neighborhood, July 12, 1691, by the forces of William III, under Ginkel, over the Irish and French troops, under St. Ruth.

Agila (ag′i-la), a resinous perfume obtained apparently from *Aquilaria agallocha.* See *Agallochum.*

Agincourt (å-zhaṇ-kör), a village of Northern France, department Pas de Calais, famous for the battle of October 25, 1415, between the French and English. Henry V, King of England, eager to conquer France, landed at Harfleur, took the place by storm, and wished to march through Picardy to Calais, but was met by a French army under the Constable d'Albret. The English numbered about 15,000 men, while the French numbers are variously stated at from 50,000 to 150,000. The confined nature and softness of the ground were to the disadvantage of the French, who were drawn up in three columns unnecessarily deep. The English archers attacked the first division in front and in flank, and soon threw them into disorder. The second division fled on the fall of the Duc d'Alençon, who was struck down by Henry himself; and the third division fled without striking a blow. Of the French 10,000 were killed. including the Constable d'Albret, with six dukes and princes. The English lost 1600 men killed, among them the Duke of York, Henry's uncle. After the battle the English continued their march to Calais.

Agio (ā′ji-o), the difference between the real and the nominal value of money, as between paper money and actual coin: an Italian term originally. Hence *agiotage,* speculation on the fluctuating differences in such values.

Agira (å-jē′rà), a town of Sicily southwest of Etna, anciently *Agyrium.* Pop. 25,000.

Agis (ā′jis), the name of four Spartan kings, the most important of whom was Agis IV, who succeeded to the throne in B. C. 244, and reigned four years. He attempted a reform of the abuses which had crept into the state—his plan comprehending a redistribution of the land, a division of wealth, and the canceling of all debts. Opposed by his colleague Leonidas, advantage was taken of his absence in an expedition against the Ætolians, to depose him. Agis at first took sanctuary in a temple, but he was entrapped and hurriedly executed by his rival.

Agitato (ä-jē-tä′tō), a term used in music to denote a restless, emotional style.

Aglaia (a-glā′ya), in Greek mythology, one of the three Graces.

Agnano (å-nyä′nō), formerly a lake of Italy west of Naples, occupying probably the crater of an extinct volcano, but now drained.

Agnates (ag′nāts), in the civil law relations on the male side, in opposition to *cognates,* relations on the female side.

Agnes, ST., a saint who, according to the story, suffered martyrdom because she steadfastly refused to marry the son of the prefect of Rome, and adhered to her religion in spite of repeated temptations and threats, A. D. 303. She was first led to the stake, but as the flames did not injure her she was beheaded. Her festival is celebrated on the 21st of January.

Agnesi (å-nyā′sē), MARIA GAETANA, a learned Italian lady, born at Milan in 1718. In her ninth year she was able to speak Latin, in her eleventh Greek; was a university professor. She died in 1799.

Agnew (ag′nö), D. HAYES, surgeon, was born in Lancaster Co., Pennsylvania, in 1818; died in 1892. An accomplished surgeon, he was a profound anatomist, and had wonderful skill and ease in operating. He became professor of surgery and honorary professor of clinical surgery at the University of Pennsylvania. He attained a world-wide reputation as one of the most skillful surgeons of the century, and was the author of *Practical Anatomy* and *The Principles and Practice of Surgery.*

Agni, the Hindu god of fire. He is celebrated in many of the hymns of the Rig Veda. He is often represented as of a red or flame color, two-faced, suggesting his destructive and beneficent character, and with three legs and seven arms. He is still worshiped in many parts of India as the personification of fire.

Agnolo, D', BACCIO (bàch′ō-dàn′yo-lō), a Florentine wood-carver, sculptor, and architect; designed some of the finest palaces, etc., in Florence, such

as the Villa Borghese, the Palazzo Bartolini, etc.; born 1460; died 1543.

Agni—Moore's Hindu Pantheon.

Agnomen (ag-nō'men) (L.), an additional name given by the Romans to an individual in allusion to some quality, circumstance, or achievement by which he was distinguished, as *Africanus* added to P. Cornelius Scipio.

Agnone (ăn-yō'nā), a town of S. Italy, prov. of Molise, famous for the excellence of its copper wares. Pop. 6,606.

Agnostics (ag-nos'tiks; Gr. *a*, not, *gignōskein*, to know), a modern term applied to those who disclaim any knowledge of God or of the origin of the universe, holding that the mind of man is limited to a knowledge of phenomena and of what is relative, and that, therefore, the infinite, the absolute, and the unconditioned, being beyond all experience, are consequently beyond its range.

Ag'nus Cas'tus, a shrub, *Vitex agnuscastus*, nat. ord. *Verbenaceæ*, a native of the Mediterranean countries, with purple flowers and acrid, aromatic fruits. It had anciently the imagined virtue of preserving chastity—hence the term *castus* (L., chaste).

Agnus Dei (dē'ī: L., 'the Lamb of God'), a term applied to Christ in John i, 29, and in the Roman Catholic liturgy a prayer beginning with the words 'Agnus Dei,' generally sung before the communion. The term is also commonly given to a medal, or more frequently a cake of wax, consecrated by the pope, stamped with the figure of a lamb supporting the banner of the cross; supposed to possess great virtues, such as preserving those who carry it in faith from accidents, etc.

Agonic Line (a-gon'ik) (Gr. *a*, not, and *gōnia*, an angle), in terrestrial magnetism a name applied to the line which joins all the places on the earth's surface at which the needle of the compass points due north and south, without any declination. This line, which varies from time to time, at present passes through S. America and N. America to the Magnetic North Pole, thence to the White Sea, south through the Persian Gulf, Indian Ocean, and Australia to the Southern Magnetic Pole.

Agora (ag'o-ra), the marketplace of a Greek town, corresponding to the Roman *forum*.

Agoraphobia (a g-ō-r å-f ō'b i-å), in pathology, a morbid fear of crossing open places. It is a feature of some cases of neurasthenia.

Agos'ta. See *Augusta*.

Agouara (ä-gu-ä'rå), a name given to the crab-eating raccoon (*Procȳon cancrivŏrus*) of S. America.

Agoult (å-gö), MARIE DE FLAVIGNY, COMTESSE D', a French writer of fiction, history, politics, philosophy, and art; daughter of Viscount de Flavigny; born at Frankfort in 1805; died at Paris 1876. She contributed many articles to the *Revue des Deux Mondes*, etc., under the name of *Daniel Stern*, and wrote *Histoire de la Révolution de 1848; Trois Journées de la Vie de Marie Stuart; Florence and Turin*, a series of artistic and political studies; *Dante and Goethe;* dialogues, and numerous romances, etc.

Agouta (å-gö'ta), *Solenŏdon paradoxus*, an insectivorous mammal peculiar to Haiti, of the tanrec family, somewhat larger than a rat. It has the

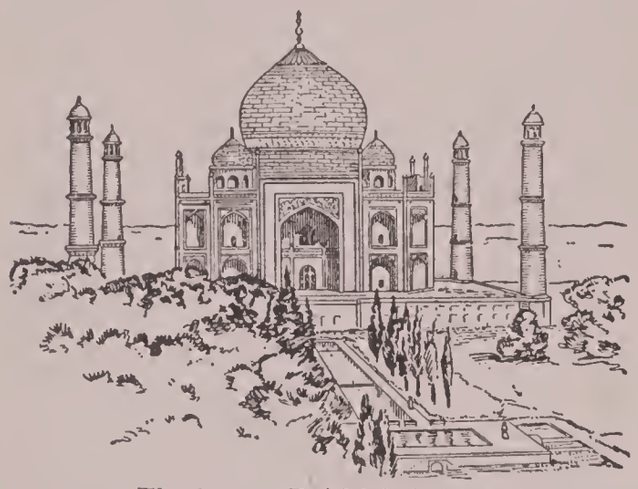
Agouta (*Solenŏdon paradoxus*)

tail devoid of hair and covered with scales, the eyes small, and an elongated nose like the shrews. Another species (*S. Cubanus*) belongs to Cuba.

Agouti (a-gö'ti), the name of several rodent mammals, forming a family by themselves, genus *Dasyprocta*. There are eight or nine species, all belonging to S. America and the W. Indies. The common agouti, or yellow-rumped cavy (*D. agouti*), is of the size of a rab-

bit. It burrows in the ground or in hollow trees, lives on vegetables, doing much injury to the sugar-cane, is as voracious as a pig, and makes a similar grunting noise. Its flesh is white and well tasting.

Agra (ä'gra), a city of India, in the Northwest Provinces, on the right bank of the Jumna, 841 miles by rail from Calcutta. It is a well-built and handsome town and has various interesting structures, among which are the imperial palace, a mass of buildings erected by several emperors; the Moti Masjid or Pearl Mosque (both within the old and extensive fort); the mosque called the Jama Masjid (a cenotaph of white marble); and, above all, the Taj Mahal, a



The famous Taj Mahal, Agra.

mausoleum of the seventeenth century, built by the Emperor Shah Jehan to his favorite queen, of white marble, adorned throughout with exquisite mosaics. Agra has a trade in grain, sugar, etc., and some manufactures, including beautiful inlaid mosaics. It was founded in 1566 by the Emperor Akbar, and was a residence of the following emperors for over a century. Pop. 185,449. The United Provinces of Agra and Oudh have an area of 107,267 sq. miles; pop. 47,182,044, including over 40,000,000 Hindus and over 6,500,000 Mohammedans.

Agraffe (a-graf'), a sort of ornamental buckle, clasp, or similar fastening for holding together articles of dress, etc., often adorned with precious stones.

Agram (og'rom), or ZAGRAB, a city, capital of the former Hungarian crownland of Croatia-Slavonia, now in the Serb-Croat-Slovene State (Jugo-Slavia). It lies near the river Save; contains government buildings, cathedral, national theater, archiepiscopal palace, academy of science, etc.; has an active trade in leather, linen, tobacco, grain and wine. Pop. 80,000.

Agrarian Laws (a-grā'ri-an), laws enacted in ancient Rome for the division of the public lands, that is, the lands belonging to the State (*ager publicus*). As the territory of Rome increased the public land increased, the land of conquered peoples being always regarded as the property of the conqueror. The right to the use of this public land belonged originally only to the patricians or ruling class, but latterly the claims of the plebeians on it were also admitted, though they were often unfairly treated in the sharing of it. Hence arose much discontent among the plebeians, and various remedial laws were passed with more or less success. Indeed, an equitable adjustment of the land question betweer the aristocracy and the common people was never attained.

Agricola (ä-gric'ō-lä), CNAEUS JULIUS, lived from A.D. 37 to 93, a Roman consul under the Emperor Vespasian, and governor in Britain, the greater part of which he reduced to the dominion of Rome; distinguished as a statesman and general. His life, written by his son-in-law, the historian Tacitus, gives the best extant account of Britain in the early part of the period of the Roman rule. He was the twelfth Roman general who had been in Britain, but was the only one who effectually subdued the southern portion of it and reconciled the Britons to the Roman yoke. This he did by teaching them the arts of civilization and to settle in towns. He constructed the chain of forts between the Forth and the Clyde, defeated Galgacus at the battle of the Grampians, and sailed round the island, discovering the Orkneys.

Agric'ola, GEORG (originally Bauer, that is, cultivator = L. *agricola*), born in Saxony 1490, died at Chemnitz 1555, German physician and mineralogist. Though tinged with the superstitions of his age, he made the first successful attempt to reduce mineralogy to a science, and introduced many improvements in the art of mining.

Agricola, JOHANN, the son of a sailor at Eisleben, was born in 1492, and called, from his native city, *master of Eisleben* (*magister Islebius*); one of the most active among the theologians who propagated the doctrines of Luther. In 1537, when professor in Wittenberg, he stirred up the Antinomian controversy with Luther and Melanchthon. He afterwards lived at Berlin, where he died in 1566, after a life of controversy. Besides his theological works he composed a work explaining the common German proverbs.

Courtesy of Chicago, Burlington & Quincy R. R.

STACKING HAY BY MODERN METHODS

A scene on the YU ranch, Big Horn County, Wyoming.

Agricultural Credit, or RURAL CREDIT, credit extended to farmers. Plans proposed for organizing rural credit are: (1) co-operative credit societies; (2) government agricultural banks; (3) loans by national or state banks. The United States Currency Act (1913) provided that any national bank not in any of the 50 reserve cities might lend money on farm property up to 50 per cent. of its capital. The amount of money available for farm loans was estimated in 1914 at $500,000,000. See *Federal Farm Loan Act.*

Agricultural Machinery and Implements, the use of which has been greatly increased in recent years through improvements and additions, has largely relieved the manual labor and enormously extended the area of cultivation, besides bringing lightened work and increased efficiency in farm life.

TILLAGE IMPLEMENTS. The first in importance is the plow. From the ancient plow of the Orient, a forked instrument terminating in a curved point and operated by a handle, has developed the steel plow, the sulky and the disk plow operated by horse and traction engine. Various modifications adapt the implements to different soils. The most common form is the mold-board plow, which is made in sizes having a range of from 6 to 18 inches, those of 12 and 14 inches being generally used. The three types in general use are the walking plow, the sulky plow, and the gang plow. With the latter, of two 12-inch bottoms, 25 to 26 inches of soil may be turned, the work requiring four horses. Rolling coulters, standing coulters and jointers are attachments for preventing clogging, covering trash and reducing the draft. The center of draft should fall directly behind the center of the team. In the large level farms of the West tractors in large units are employed, but they are unsuited to the smaller and more divided farms in other sections, hence the building of smaller and more compact machinery has taken a great stride and is being employed on farms of 160 acres or less.

The Harrow is second in importance to the plow. There are several forms of this implement, as smoothing, spring-toothed and disk, which again are of several different forms. The smoothing harrow, with frame of steel furnished with levers to set the teeth at the desired angle, is the most serviceable. Solid construction is of prime importance; the teeth should be quite sharp and the clamps holding them in place should be very firm.

Cultivators are of very wide use, in cleaning truck crops, for orchards, and for general inter-tilled crops, corn, cotton, potatoes and others. There are several forms and sizes requiring from one to four horses, and to operate either walking or riding.

Seeding machines have largely superseded hand seeding. *Broadcast Seeders* have long hoppers, are carried on two wheels, and fed by an agitator or by force. The former, which is the less satisfactory method, operates with a revolving agitator passing over each opening through which the seed passes and preventing stoppage. The bottoms of the hoppers have openings the size of which may be adjusted to control the rate of seeding. Even distribution is made by means of a vibrating board on which the seed falls, or by fan-shaped spouts through which it passes. The wheelbarrow seeder used in sowing grass and clover operates similarly, but it is not furnished with vibrating board or spouts. The advantage of the force feed is that it can be set to seed at any desired speed and uniformity is more nearly assured. These seeders are sometimes attached to disk harrows. If placed before the disks, the seed is somewhat deeply covered; if behind them, it will lie on the surface and must be covered by another harrow following the disk harrow.

Grain drills have been used for nearly two centuries, but their practical value in the United States has only been since the middle of the last century. They are now more extensively used than broadcast seeders, their chief advantage being in a uniform depth of planting that is controlled to suit the kind of seed and the condition of the soil. They also save seed as compared with the broadcast type, though they are more expensive, heavier of draft and slower in seeding. The earlier forms of hoe and shoe furrow openers have largely given place to the disk form, which is used singly or double. Sometimes press wheels are attached to follow the disks, to compact the soil covering the seed. Covering chains are also used, but these serve only to insure the covering of the seed. The seed is fed through tubes attached to the furrow openers, which are spaced about 7 inches apart, and these tubes are connected by flexible tubes with the seed box. Grass seed attachments, as well as those for fertilizers, may be used with the drills.

Corn Planters are among the most important of farm implements, as so much depends upon accuracy in planting the corn seed, to ensure efficient and economical tillage of the crop. The essential re-

quirements of a planter is a dropper capable of accurate adjustment so that the kernels of corn be not broken, and the plates selected to drop the desired number. The plates are of two forms, round-holed and edge-selection. The furrow openers are either curved runners, stub runners, single and double disks, the choice of which is governed by the character and condition of the soil and the absence or presence of trash. The frame of the machine is supported by either solid or open wheels, whose function is to cover the seed and compress the earth about it. The former has preferably a concave surface as it closes the furrow more thoroughly and leaves a track slightly raised at its center. The open wheel leaves a narrow ridge of loose earth in the center of the track directly over the corn, which has the advantage of preventing crusting of the soil over the seed when rain follows the planting. *Check-rowers* are attachments to the planters to have the plants in rows in both directions, enabling cross cultivation.

Harvesting Machinery exhibits the most striking labor-saving improvements of all those affected in farm implements. The essential features of the *Mowing Machine* are the cutting bar, guards and sickle, and the gearing that transmits the power employed from the wheels to the cutting parts. The adjustment for regulating the height of the cutting is very important, and also that for readily elevating the cutting bar to escape obstructions in its path. The bearings should likewise be easy of adjustment so that they may be kept tight. The most usually employed machine is that having a six-foot cutting bar and is drawn by two horses.

The Self-Binder is a modern machine that largely displaced the Self-Rake Reaper, although the latter is still favored for harvesting certain crops, as buckwheat, flax, and clover for seed where the crops are large, because of its greater economy. The binder is a more or less complicated machine and calls for a thorough knowledge of its parts by the operator to ensure its smooth and efficient working. Its essential parts are a cutting device, elevators and binding apparatus, besides the reel and its several adjustments and the bundle carrier.

The Corn Harvester has developed from the binder and its cutting and binding parts are constructed on the same principles. Its use, however, requires stronger construction than that machine. The apparatus for conveying the stalks to the binder differs considerably from that of the self-binder. The machine is designed to cut a single row of corn at a time, and is largely used in cutting green corn for the silo, as well as the matured corn.

The Threshing Machine of the modern type separates the grain from the straw, winnows out the chaff and waste, conveys the grain to the bag or wagon and delivers the straw to the stack. This machine is too complicated for popular description; it is rather a machine used on farms than a farm machine. That used by farmers individually is a small one relatively; its essential operating points are speed of cylinder, setting of the concaves, and the number of teeth to remove all grains from the heads, the speed of the fan, and the selection and adjustment of the sieves. The cylinder should be run at uniform speed, the fan should clean the grain but not blow the grain into the straw. Ample power, either steam, gasoline or electric, is necessary for rapid and efficient work.

The Corn Sheller used in the great corn-growing sections is a large machine that shells nearly all the corn that reaches the great markets, and, like the great modern thresher, is generally owned and operated for community work. The sheller used by the individual farmer is a small machine operated by hand or power, and is of two forms, the spring sheller and the cylinder sheller, the first of which comprises all hand and some of the power machines. This type does not break the cobs and is therefore preferred to the cylinder type, which, however, has the advantage of simpler construction and less liability to get out of order. With the larger shellers of these types a cleaning device is provided which separates chaff, husks and cobs from the shelled corn, and an elevator that elevates both the shelled corn and the cobs.

The Silage Cutter is now almost universally found on dairy farms. Its essential parts are a feeding table which has an endless apron for feeding the corn into the cutting device, the cutter head and the elevator. The cutter head has radial knives fastened directly to the flywheel, or spiral knives fastened to a shaft. The elevator is a tight metal tube through which a fan drives a blast of air, which carries the cut corn to the top of the silo.

The Manure Spreader is a very important implement, economic as to labor and advantageous as to results. The essential features are strength, good capacity, an apron that works freely, and a beater that spreads evenly. Good machines are adjustable to spread any quantity of manure that it is desired to apply.

Mention has already been made of the tractor on the farm. The most advantageous tractor for the average farm, probably, is of five tractive and ten-belt

horsepower which would operate one fourteen-inch or two ten-inch plows, besides providing the necessary power for the threshing machine and a small silage cutter, and for driving the other implements to which power is requisite on the farm. There are many excellent makes of farm tractors on the market and their employment is being greatly extended in the eastern section. Of the type of tractor best fitted, the multi-cylinder engine is the more dependable for constant power and better speed. The initial cost is greater than that of the one-cylinder type, but their greater efficiency more than offsets this difference.

Agriculture (ag'ri-kul-tūr), is the art of cultivating the ground in order to raise grain and other crops for man and beast; including the art of preparing the soil, sowing and planting seeds, removing the crops, and also the raising and feeding of cattle and other live stock. This art is in all countries coeval with the first dawn of civilization. At how remote a period it must have been successfully practised in Egypt, Mesopotamia, and China we have no means of knowing. Egypt was renowned as a corn country in the time of the Jewish patriarchs, who themselves were keepers of flocks and herds rather than tillers of the soil. Among the ancient Greeks the implements of agriculture were very few and simple. Hesiod, the earliest writer on agriculture, wrote a poem on this subject as early as the eighth century B. C., and speaks of a plow consisting of three parts, the share-beam, the draught-pole, and the plow-tail, but antiquarians are not agreed as to its exact form. The ground received three plowings, one in autumn, another in spring, and a third immediately before sowing the seed. Manures were applied, and the advantage of mixing soils, as sand with clay or clay with sand, was understood. Seed was sown by hand, and covered with a rake. Grain was reaped with a sickle, bound in sheaves, thrashed, then winnowed by wind, laid in chests, bins or granaries, and taken out as wanted by the family, to be ground. Evidently the art had made considerable progress by that early date. Agriculture was highly esteemed among the ancient Romans. Cato, the censor, who was celebrated as a statesman, orator, and general, derived his highest honors from having written a voluminous work on agriculture. In his *Georgics* Virgil has thought the subject of agriculture worthy of being treated in the most graceful and harmonious verse. The Romans used a great many different implements of agriculture. The plow is represented by Cato as of two kinds, one for strong, the other for light soils. Varro mentions one with two mold-boards, with which, he says, 'when they plow after sowing the seed, they are said to ridge.' Pliny mentions a plow with one mold-board, and others with a coulter, of which he says there were many kinds. Fallowing was a practice rarely deviated from by the Romans. In most cases a fallow and a year's crop succeeded each other. Manure was collected from nearly or quite as many sources as have been resorted to by the moderns. Irrigation on a large scale was applied both to arable and grass land.

The Romans introduced their agricultural knowledge among the Britons and other peoples of Europe, and during the most flourishing period of the Roman occupation large quantities of corn were exported from Britain to the Continent. During the time that the Angles and Saxons were extending their conquests over the British island agriculture must have been greatly neglected; but afterwards it was practised with some success among the Anglo-Saxon population, especially, as it was generally the case during the middle ages, on lands belonging to the church. Swine formed at this time a most important portion of the live stock, finding plenty of oak and beech mast to eat. The feudal system, though beneficial in some respects as tending to ensure the personal security of individuals, operated powerfully against progress in agricultural improvements. War and the chase, the two ancient and deadliest foes of husbandry, formed the most prominent occupations of the feudal princes and nobles. Thriving villages and smiling fields were converted into deer forests, vexatious imposts were laid on the farmers, and the serfs had no interest in the cultivation of the soil. But the monks of every monastery retained such of their lands as they could most conveniently take charge of, and these they cultivated with great care, under their own inspection, and frequently with their own hands. The various operations of husbandry, such as manuring, plowing, sowing, harrowing, reaping, thrashing, winnowing, etc., are incidentally mentioned by the writers of those days; but it is impossible to collect from them a definite account of the manner in which those operations were performed.

The first English treatise on husbandry and the best of early modern works on the subject was published in the reign of Henry VIII (in 1534), by Sir A. Fitzherbert, judge of the Common Pleas. It is entitled the *Book of Husbandry*, and contains directions for draining, clearing, and inclosing a farm, for enriching the soil, and rendering it fit for

tillage. Lime, marl, and fallowing are strongly recommended. About 1645 the field cultivation of red clover was introduced into England, the merit of this improvement being due to Sir Richard Weston, author of a 'Discourse on the Husbandry of Brabant and Flanders.' The Dutch had devoted much attention to the improvement of winter roots, and also to the cultivation of clover and other artificial grasses, and the farmers and proprietors of England soon saw the advantages to be derived from their introduction. The cultivation of clover soon spread, and Sir Richard Weston seems also to have introduced turnips. Potatoes had been introduced during the latter part of the sixteenth century. In the eighteenth century the first name of importance in British agriculture is that of Jethro Tull, who advocated the sowing of crops in rows or drills with an interval between every two or three rows wide enough to allow of plowing or hoeing. By the end of the century it was a common practice to alternate green crops with grain crops, instead of exhausting the land with a number of successive crops of corn. A well-known writer on agriculture at this period, and one who did a great deal of good in diffusing a knowledge of the subject, was Arthur Young. In Europe at large the principal cereals at present are wheat, oats, maize, barley, and rye, wheat being mainly grown in the middle and southern regions, such as France, Spain, part of Germany, Austria, Hungary, Italy, and southern Russia, oats, barley and rye in the more northern portion, while maize is grown in the warmest parts. The most important of the cereals are wheat, rice and maize, the first being grown largely in the United States, Canada, Argentina and Australia; the second in China, Japan and India; and the last in the United States and Mexico.

The vast territory of the United States presents every variety of soil and climate. Its agriculture embraces all the products of European cultivation, together with some of those of the warmer countries, as cotton, sugar, and indigo. The agricultural implements are, in many respects, similar to those of Great Britain and France, but, as a general rule, those of the United States exceed all others in their wonderful adaptation for all purposes of cultivation and harvesting of crops. So successful have been our farming implements in repeated contests on European soil that their rapid introduction into foreign markets has only been impeded by the great demand at home. The disposition of the American to experiment, to test alleged improvements, and adopt labor-saving expedients, is a great incentive to inventors. Nor is the spirit of investigation confined to invention. For one of the many instances of modern methods, see *Dry Farming*.

The American reaper was invented by McCormick in 1834; by many improvements it has secured the European as well as the home market. In 1857 the first American agricultural college was established. In 1862 the passage of the *Homestead* law served to accelerate the occupation of the public lands. In the same year Congress granted to each State 30,000 acres for each Senator and Representative in Congress in order to promote the liberal and practical education of the industrial classes. In 1867 the organization of the Patrons of Husbandry, commonly called Grangers, was effected, to look after the interests of farmers, to reduce the profits of middlemen, and to insist on fair treatment from the railroads. The American dairy system, based on the principle of association, has advanced rapidly. Agricultural societies, both State and county are established in all parts of the United States.

Through the efforts of the above-mentioned and other societies, the investigations of scientific men, and the general diffusion of knowledge among all classes, over two hundred periodicals being devoted to its interests, agriculture has made great progress during the recent centuries. Among the chief improvements we may mention deep plowing and thorough draining. By the introduction of new or improved implements the labor necessary to the carrying out of agricultural operations has been greatly diminished. Science, too, has been called in to act as the handmaid of art, and it is by the investigations of the chemist that agriculture has been put on a really scientific basis. The organization of plants, the primary elements of which they are composed, the food on which they live, and the constituents of soils, have all been investigated, and most important results obtained, particularly in regard to manures and rotations. Artificial manures, in great variety, to supply the elements wanted for plant growth, have come into common use, not only increasing the produce of lands previously cultivated, but extending the limits of cultivation itself. An improvement in all kinds of stock is becoming more and more general, feeding is conducted on more scientific principles, and improved varieties of plants used as field crops have been introduced. One of the recent developments in the United States is the introduction of the system of *ensilage* for preserving fodder in a green state, which has given

valuable results, and silos are adjuncts of modern farms throughout the country.

As a result of the new conditions, to be a thoroughly trained and competent agriculturist requires a special education partly theoretical, partly practical. In some countries there are now agricultural schools and colleges supported by the State which give thorough courses in the theory and practice. In the United States nearly all the States have colleges, or departments of colleges, devoted to the teaching of agriculture, and large allotments of public land have been made for their support. In Germany such institutions are numerous and highly efficient, and in Europe generally the ground is cultivated more closely and yields more largely than in the United States. For teaching agriculture practically model farms have been widely established.

Experiments in the use of radium as a fertilizer have been made by Dr. H. H. Rusby, of the New York College of Pharmacy. He diluted three milligrams of radium in a ton of water, and this amount, he states, will thoroughly fertilize 20 acres of land at a cost of about $30. Other successful experiments have been made by the New York Botanical Garden and the University of Prague.

Explosives have been used to good advantage in agriculture, and in 1914 farmers, nurserymen and orchardists of the United States used approximately 25,000 pounds of explosives in preparing land for cultivation and in increasing crop and fruit production. One of the most striking and thoroughly established uses of explosives in agriculture is for preparing ground for the planting of trees and in the treatment of old or diseased fruit, shade or ornamental trees, to give them renewed life. The method of blasting is very simple and the explosive is usually the low grade of dynamite known as farm powder.

Agriculture, DEPARTMENT OF, first established by Congress as a commissionership in 1862, was changed to a government department in 1889, having a Cabinet officer, the Secretary of Agriculture, at its head. It diffuses matter deemed advantageous to agricultural interests by issuing monthly and annual reports throughout the country and through the Secretary maintains control of animal quarantine stations, administers the interstate game laws, and exercises general supervision over the government experiment stations. It has several bureaus—the Bureau of Animal Industry; of Chemistry; of Plant Industry; of Forestry; of Soils; and the Weather Bureau; an Office of Experiment stations, many divisions, a library and propagating grounds. At the latter plants received in exchange from foreign governments, botanic gardens and private persons are tested as to their suitability for being introduced in the United States. By this means many new and useful plants have become known here. Seeds are distributed free to those applying for them. Agricultural experiment stations have been introduced into all the states and territories. State and county agricultural fairs are very common, and through these varied means agriculture is rapidly advancing.

Agrigentum (a-gri-jèn'tum), an ancient Greek city of Sicily (the modern *Girgenti*), founded about 580 B. C., and long one of the most important places on the island. Extensive ruins of splendid temples and public buildings yet attest its ancient magnificence. See *Girgenti.*

Ag'rimony (*Agrimonia*), a genus of plants, natural order Rosaceæ, consisting of slender perennial herbs found in temperate regions. *A. eupatoria*, or common agrimony, was formerly of much repute as a medicine. Its leaves and root-stock are astringent, and the latter yields a yellow dye.

Agrippa (ä-grip'pä), CORNELIUS HENRY, born in 1489, at Cologne, was a man of talents, learning, and eccentricity. In his youth he was secretary to the Emperor Maximilian I; he subsequently served seven years in Italy, and was knighted. On quitting the army he devoted himself to science, and became famous as a magician and alchemist, and was involved in disputes with the churchmen. After an active, varied, and eventful life he died at Grenoble in 1535.

Agrippa, HEROD. See *Herod Agrippa.*

Agrippa, MARCUS VIPSANIUS, a Roman statesman and general, the son-in-law of Augustus; born B. C. 63, died B. C. 12. He was prætor in B. C. 41; consul in 37, 28, and 27; ædile in 33; and tribune from 18 till his death. He commanded the fleet of Augustus in the battle of Actium. To him Rome is indebted for three of her principal aqueducts, the Pantheon, and several other works of public use and ornament.

Agrippina (ag-rip-pī'na), the name of several Roman ladies, among whom we may mention:—1. The youngest daughter of Marcus Vipsanius Agrippa, and wife of C. Germanicus; a heroic woman, adorned with great virtues. Tiberius, who hated her for her virtues and popularity, banished her to the island of Pandataria, where she starved herself to death in A. D. 33.—2.

A daughter of the last mentioned, and the mother of Nero, by Domitius Ahenobarbus. Her third husband was her uncle, the Emperor Claudius, whom she subsequently poisoned to secure the government of the empire through her son Nero. After ruling a few years in her son's name he became tired of her ascendency, and caused her to be assassinated (A.D. 59).

Agrostem'ma. See *Lychnis.*

Agrostis (a-gros'tis), a genus of grasses, consisting of many species, and valuable as pasture and lawn grasses. The bent-grasses belong to the genus.

Agtelek (ag'te-lek), a village in Hungary, near the road from Pesth to Kaschau, with about 600 inhabitants, celebrated for one of the largest and most remarkable stalactitic caverns in Europe.

Agua (äg'wà), an active volcano of Central America, in Guatemala, rising to the height of 13,000 feet. It has twice destroyed the old city of Guatemala, in its immediate vicinity.

Aguara (á-gwä'rá). See *Agouara.*

Aguardiente (ä-gwär-dē-en'te), a popular spirituous beverage of Spain and Portugal, a kind of coarse brandy, made from red wine, from the refuse of the grapes left in the wine-press, etc., generally flavored with anise; also a Mexican alcoholic drink distilled from the fermented juice of the agave.

Aguas Calientes (ág'wás ká-lē-en'-tās; lit. 'warm waters'), a town 270 miles N. W. of Mexico, capital of the state of its own name, named from the thermal springs near it; has manufactures of cottons and a considerable trade. Pop. 40,000.

Ague (ā'gū), malarial or intermittent fever. See *Malaria.*

Ague-cake, a tumor caused by enlargement and hardening of the spleen, often the consequence of ague, or intermittent or malaria fever.

Aguesseau, D', (á-ges-ō). HENRI FRANÇOIS, a distinguished French jurist and statesman, born at Limoges in 1668; was in 1690 advocate-general at Paris, and at the age of thirty-two procureur-général of the parliament. He risked disgrace with Louis XIV, by successfully opposing the famous papal bull Unigenitus. He was made chancellor in 1717, and was several times removed and restored, finally holding the office from 1737 to 1750. He died in 1751.

Aguilar (á-gē-lär'), a town of Spain, province of Cordova, in Andalusia, in a good wine-producing district, and with a trade in corn and wine. Pop. 13,330.

Aguilar (a-gi-lär'), GRACE, an English writer, born at Hackney 1816; died at Frankfort 1847. Of Jewish parentage, she at first devoted herself to Jewish subjects, but her fame rests on her novels, *Home Influence, A Mother's Recompense, Home Scenes* and *Heart Studies*, etc., most of which were published posthumously under the editorship of her mother.

Aguilas (á-gē'lás), a flourishing seaport of southern Spain, province of Murcia, with copper and lead smelting works. Pop. 15,868.

Aguinaldo (á-gwi-nal'dō), EMILIO, Philippine leader, born at Cavite, Luzon Island, in 1869. In 1896 he became active as an insurrectionist against the Spanish rule, and was chosen President of the patriotic Tagal Republic. After the capture of Manila by the Americans he became the leader in an insurrection against them, and conducted the subsequent war with signal ability, considering his paucity of means and the character of his troops. His army being dispersed, he carried on a guerrilla warfare, until captured by General Funston, March 23, 1901. Since then he has lived as a quiet but influential citizen.

Agulhas (á-gul'yäs), CAPE, a promontory, forming the most southern extremity of Africa, about 90 miles southeast of the Cape of Good Hope, rising to 455 feet above the sea, with a lighthouse.

Agu'ti. See *Agouti.*

Ahab (ā'hab), the seventh King of Israel, succeeded his father Omri, 928 B.C., and reigned twenty years. At the instigation of his wife Jezebel he erected a temple to Baal, and became a cruel persecutor of the true prophets. He was killed by an arrow at the siege of Ramoth-Gilead.

Ahaggar (a-hag'gar), a mountainous region of the Sahara, south of Algeria, with some fertile valleys, inhabited by the Tuaregs.

Ahasuerus (a-has-yu-ē'rus), in Scripture history, a King of Persia, probably the same as Xerxes, the husband of Esther, to whom the Scriptures ascribe a singular deliverance of the Jews from extirpation.—AHASUERUS is also a Scripture name for Cambyses, the son of Cyrus (Ezra, iv, 6), and for Astyages, King of the Medes (Dan. ix. 1).

Ahaz (ā′haz), the twelfth King of Judah, succeeded his father Jotham, 742 B.C. Forsaking the true religion he gave himself up completely to idolatry, and plundered the temple to obtain presents for Tiglath-pileser, King of Assyria.

Ahaziah (ā-ha-zī′a) :—1. Son of Ahab and Jezebel, and eighth King of Israel, died from a fall through a lattice in his palace at Samaria after reigning two years (B. C. 896, 895).—2. Fifth King of Judah, and nephew of the above. He reigned but one year, and was slain (B. C. 884) by Jehu.

Ahithophel (ā-hith′o-fel), privy-councilor to David, and confederate and adviser of Absalom in his rebellion against his father. When Hushai's advice prevailed, Ahithophel, despairing of success, hung himself.

Ahmedabad, or AHMADABAD (ä-mad-ä-bäd′), a town of India, presidency of Bombay, in district of its own name, on the left bank of the Sábarmatí, 310 miles north of Bombay. It was founded in 1412 by Ahmed Shah, and was converted by him into a great capital, adorned with splendid edifices. It came finally into the hands of the British in 1818. It is still a handsome and populous place, enclosed by a wall, with many noteworthy buildings; manufactures of fine silk and cotton fabrics, cloths of gold and silver, pottery, paper, enamel, mother-of-pearl, etc. Pop. 215,835.

Ahmed Mirza (ä′med mėr′za), Shah of Persia, born in 1897. His father, Mohammed Ali Mirza, was deposed by revolutionaries July 16, 1909, and the son, a boy of 12, raised to the vacant throne under the regency of his uncle. Crowned July 21, 1914.

Ahmednagar (ä-med-na′gar), a town of India, presidency of Bombay, in district of its own name, of commonplace appearance, surrounded by an earthen wall; with manufactures of cotton and silk cloths. Near the city is the fort, built of stone and 1 mile round. Pop. 43,032.

Ahmed Shah (ä*h*′med), born 1724; died 1773, founder of the Durâni dynasty in Afghanistan. On the assassination of Nadir he proclaimed himself shah, and set about subduing the provinces surrounding his realm. Among his first acts was the securing of the famed Koh-i-noor diamond, which had fallen into the hands of his predecessor. He crossed the Indus in 1748, and his conquests in northern India culminated in the defeat of the Mahrattas at Panipat (6th Jan., 1761). Affairs in his own country necessitated his withdrawal from India, but he extended his empire in other directions far beyond the limits of modern Afghanistan. He was succeeded by his son Timur.

Ahriman (ä′ri-man; in the Zend *Angromainyus*, 'spirit of evil or annihilation,'), according to the dualistic doctrine of Zoroaster, the origin or the personification of evil, sovereign of the Devas or evil spirits, lord of darkness and of death, being thus opposed to Ormuzd (*Ahuramazda*), the spirit of good and of light.

Ahwas (ä′waz), a small Persian town on the river Karun, province of Khuzistan, in the immediate neighborhood of which are the vast ruins of a city, ascribed to the time of the Parthian empire, extending for 12 miles along the river side. Pop. 2,000.

Ai (ä′ē). See *Sloth.*

Aid (ād), a subsidy paid in the feudal period by vassals to their lords on certain occasions, the chief of which were: when their lord was taken prisoner and required to be ransomed, when his eldest son was to be made a knight, and when his eldest daughter was to be married and required a dowry. From the Norman conquest to the fourteenth century the collecting of aids by the crown was one of the forms of taxation, being latterly regulated by parliament.

Aidan, SAINT (ā′dan), Bishop of Lindisfarne, was originally a monk of Iona, in which monastery Oswald I, who became King of Northumberland in 635, had been educated. At the request of Oswald, Aidan was sent to preach Christianity to his subjects, and established himself in Lindisfarne as the first of the line of bishops now designated of Durham. He died in 651.

Aide-de-camp (ād-dė-kăn), a military officer who conveys the orders of a general to the various divisions of the army on the field of battle, and at other times acts as his secretary and general confidential agent.

Aidin (ä-i-dēn′), or GUZEL HISSAR, a town in Asia Minor, about 60 miles southeast of Smyrna, with which it is connected by rail; has fine mosques and bazaars, and has manufactures of morocco leather and an extensive trade in cotton, leather, figs, grapes, etc. Formerly Turkish, it was allotted to Greece in 1919. Pop. 35,000.

Aigrette (ā′gret) (French), a term used to denote the feathery crown attached to the seeds of various plants, such as the thistle, dandelion, etc. (called in botany *pappus*).—It is also applied to any head-dress in the form of

a plume, whether composed of feathers, flowers, or precious stones.

Aigues Mortes (āg mort; L. *Aquæ Mortuæ*, 'dead waters'), a small town of southern France, near the mouths of the Rhone, department of Gard; with ancient walls and castle; near it are lagoons, from which great quantities of salt are secured. It was from this place that Louis IX embarked in 1248 and 1270 for the seventh and eighth crusades. Pop. 3900.

Aiguille (ā-gwēl'; Fr., lit. a needle), a name given in the Alps to the needle-like points or tops of granite, gneiss, quartz, and other crystalline rocks and mountain masses. Also a term applied to a rock-perforating drill.

Aiguillete (ā-gwi-let'), a military and naval decoration consisting of bullion cords and loops worn on the shoulder.

Aikin (ā'kin), JOHN, an English doctor and writer, born in 1747, died in 1822. He practised as a physician at Chester, Warrington, and London; turned his attention to literature and published various works of a miscellaneous description, including the popular *Evenings at Home* (1792–95), written with the view of popularizing scientific subjects. His *General Biographical Dictionary* was begun in 1799 and finished in 1815.

Aikman (āk'man), WILLIAM, an eminent Scottish portrait-painter; born in Forfarshire in 1682; died in 1731. He studied at Edinburgh and in Italy, visited Turkey, and spent the later portion of his life in London, where he enjoyed the friendship of most of the distinguished men of Queen Anne's time.

Ailanto, AILANTHUS (ā-lan'thus), a tree, genus *Ailantus*, nat. ord. Simarubaceæ. The *A. glandulōsa*, a large and handsome tree, with pinnate leaves one or two feet long, is a native of China, but has been introduced into Europe and the United States, where it is in favor for its elegant foliage. A species of silkworm, the ailanthus silkworm (*Saturnia cynthia*), feeds on its leaves, and the material produced, though wanting the fineness and gloss of mulberry silk, is produced at less cost, and is more durable. The wood is hard, heavy, glossy, and susceptible of a fine polish.

Ailred (āl'red), (contracted form of Ethelred), a religious and historical writer, born 1109; died 1166; abbot of Rievaulx, in the north riding of Yorkshire. Wrote lives of *Edward the Confessor* and *St. Margaret, Queen of Scotland, Genealogy of the Kings of England, The Battle of the Standard*, etc.

Ailsa Craig (āl'sa crāg), a rocky islet in the Firth of Clyde, 10 miles from the coast of Ayr, of a conical form, 1114 feet high, and about 2 miles in circumference, precipitous on all sides except the northeast, where alone it is accessible, frequented by innumerable sea-fowl, including solan-geese, and covered with grass. On it is a lighthouse.

Ailu'rus. See *Panda.*

Aimard (ā-mär), GUSTAVE, a French novelist; born in 1818, died in 1883. He lived for ten years among the Indians of North America, and wrote a number of stories dealing with Indian life, which have been popular in English translations.

Ain (aṇ), a southeastern frontier department of France, mountainous in the east (ridges of the Jura), flat or undulating in the west, divided into two nearly equal parts by the river Ain, a tributary of the Rhone; area, 2248 square miles. Capital, Bourg. Pop. 345,856. The Ain river (118 miles long) traverses its center.

Ainmüller (īn'mül-er), MAX EMANUEL, a German artist who may be regarded as the restorer of the art of glass-painting; born 1807, died 1870. As inspector of the state institute of glass-painting at Munich he raised this art to a high degree of perfection by the new or improved processes introduced by him. His son HEINRICH, born 1837, gained a high reputation in the same field.

Ainos (ī'nōz; that is, men), the native name of an uncivilized race of people inhabiting the Japanese island of Yesso, as also Saghalien, and the Kurile Islands, and believed to be the aboriginal inhabitants of Japan. They do not average over 5 feet in height, but are strong and active. They have matted beards 5 or 6 inches in length, and black hair which they allow to grow till it falls over their shoulders. Their complexion is dark brown, approaching to black. They worship the sun and moon, and pay reverence to the bear. They support themselves by hunting and fishing.

Ainsworth (ānz'worth), HENRY, a Puritan divine and scholar; born 1571, died 1622. He passed a great part of his life in Amsterdam, being from 1610 pastor of a 'Brownist' church there (the Brownists being forerunners of the Independents). He was a voluminous writer, a controversialist and commentator, and a thorough Hebrew scholar.

Ainsworth, ROBERT, born in Lancashire, 1660; died there in 1743. He is principally known as the

author of a long-popular Latin and English dictionary.

Ainsworth, WILLIAM FRANCIS, an English physician, geologist, and traveler; born 1807. He was surgeon and geologist to the Euphrates expedition under Col. Chesney, and published *Researches in Assyria, Babylonia, and Chaldea* (1838), *Travels in Asia Minor, Mesopotamia, and Armenia* (1842), *Travels in the Track of the Ten Thousand Greeks* (1844), etc. Died 1896.

Ainsworth, WILLIAM HARRISON, an English novelist; born in 1805, died in 1882. He was the son of a Manchester solicitor, and intended for the profession of law, but devoted himself to literature. He wrote *Rookwood* (1834), *Jack Sheppard* (1839), and about forty other novels.

Ain-Tab (á-in-täb'), a town of Northern Syria, 60 miles north of Aleppo; with manufactures of cottons, woolens, leather, etc., and an extensive trade. There is here an American Protestant mission. Pop. about 45,000.

Air (ār), the gaseous substance of which our atmosphere consists, being a mechanical mixture of 77.00 per cent. by measure of nitrogen, 20.75 per cent. of oxygen, argon (0.75–0.80), carbon dioxide, water-vapor (0.5–1.5), and traces of ammonia, sulphur dioxide, nitric acid, and other minor constituents. Oxygen is absolutely essential to animal life, while nitrogen serves to dilute it and is essential to plant life, though not in its gaseous state. Oxygen is more soluble in water than nitrogen, and hence the air dissolved in water contains about 10 per cent. more oxygen than atmospheric air. The oxygen, therefore, available for those animals which breathe by gills is somewhat less diluted with nitrogen, but it is very much diluted with water. For the various properties and phenomena connected with air see such articles as *Atmosphere, Aëronautics, Air-pump, Barometer, Combustion, Respiration,* etc.

Air, in music (in Italian, *aria*), a continuous melody, in which some lyric subject or passion is expressed. The lyric melody of a single voice, accompanied by instruments, is its proper form of composition. Thus we find it in the higher order of musical works; as in cantatas, oratorios, operas, and also independently in concertos. AIR is also the name often given to the upper or most prominent part in a concerted piece, and is thus equivalent to *treble, soprano,* etc.

Aïr, or ASBEN. See *Asben.*

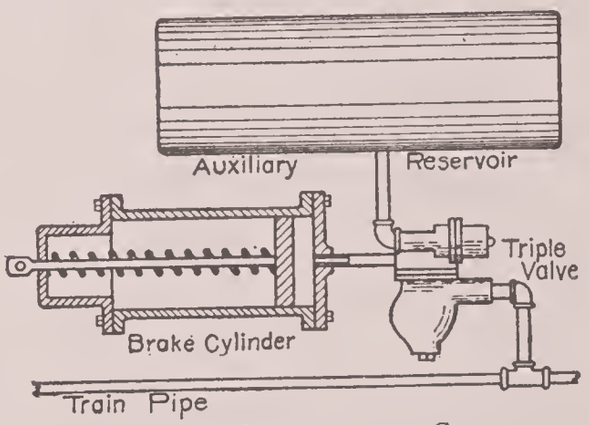
Aira. See *Hair-grass.*

Air Beds and Cushions, often used by the sick and invalids, are composed of India rubber or of cloth made air-tight by a solution of India rubber, and when required for use filled with air, which thus supplies the place of the usual stuffing materials.

Air-bladder. See *Swimming-bladder.*

Air-bone, a bone having a large cavity filled with air, as in birds; the atmosteon or ossified membranous tube conveying air to the bone of a bird.

Air-brake, an appliance used on railway cars for setting the brakes by means of the force of compressed air acting upon a piston. The



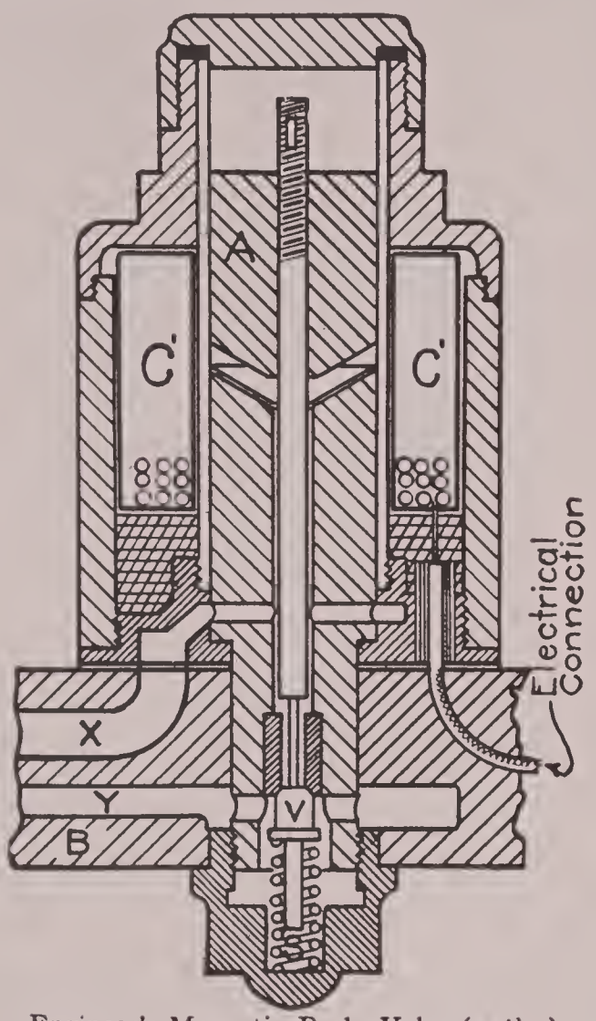
Air-brake Equipment on Car

air-brake, in its original form, was the invention of George Westinghouse, of Pittsburgh, Pa., and was patented in 1869. It provides a quick and powerful means of controlling the long and heavy trains which are the economic result of operating conditions in America. Safety demands, and economy of operation requires a more powerful device than the old hand-brake. Air-brake equipment is now required by law on both freight and passenger trains.

Compressed air for operating the brakes of a train is provided by a direct-acting, steam-driven air pump on the locomotive, which discharges into a storage tank on the locomotive or tender. From the tank it is passed through the engineer's brake valve into the train pipe, which extends throughout the length of the train. Air-tight, detachable couplings are provided between cars. The essential parts of the mechanism on each car are: the brake cylinder with its piston, the auxiliary reservoir, and the triple valve.

When the engineer's brake valve is in running position the train pipe is connected to the storage tank and carries full

tank pressure. The triple valve is then set as shown. The auxiliary tank communicates with the train pipe through connection 'A,' passages e, g, i, k, and connection 'B.' The brake cylinder is

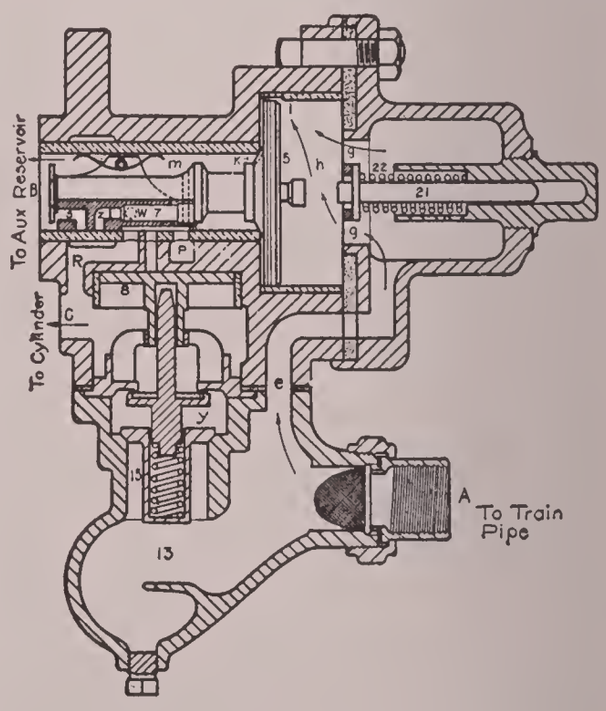


Engineer's Magnetic Brake Valve (*section*)

then open to the atmosphere through connection 'C,' and exhaust port 'P.' The spring inside the brake cylinder holds the piston to the end of its stroke and the brake shoes away from the wheels. For an ordinary or service application of the brakes the brake valve lever is moved so as to cut off the train pipe from the storage tank and open it to the atmosphere for a sufficient length of time to reduce the pressure therein by six or eight pounds. This reduces the pressure in chamber h in the triple valve, and the unbalanced pressure from the auxiliary reservoir acting on the back of piston 5 moves it and its attached parts against plunger 21. Thus port i is closed, shutting off the connection between the train pipe and auxiliary reservoir. By the same movement passage z is brought opposite the passage leading to the brake cylinder through connection 'C.' Air from the auxiliary reservoir enters the brake cylinder through connection 'B,' port w, valve 7, passage z and connection 'C,' and moves the brake piston against its spring, applying the brakes.

When an emergency stop is to be made, requiring the quickest possible application of the brakes, the engineer's brake valve is moved so as to cut off the supply from the storage tank and give a very sudden reduction in the train pipe pressure. A much greater unbalanced pressure then acts against piston 5 in the triple valve, moving it as before but with much greater force, so that plunger 21 is driven to the limit of its motion against spring 22, bringing port s in connection with the brake cylinder. At the same time port z admits air above piston 8, forcing it down and opening the valve at y. Train pipe pressure is thus admitted to the brake cylinder through chamber 13, valve y and connection 'C.' This larger opening admits air to the brake cylinder more rapidly and secures an earlier and more powerful action of the brakes.

After any application the release is obtained by moving the brake valve lever to the running position which connects the train pipe with the storage tank, admitting full pressure to chamber h of the triple valve. The pressure in h is now



Triple-action Valve

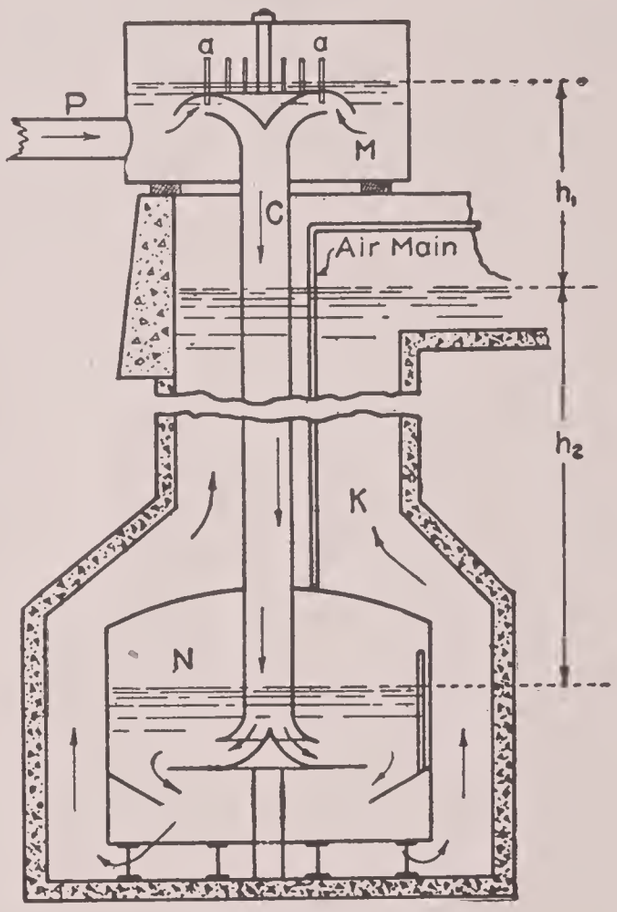
greater than the auxiliary tank pressure, and piston 5 is moved to the left, cutting off the connection between auxiliary tank and brake cylinder, and again opening the brake cylinder to the atmosphere through

port 'P.' The brake piston is returned by the spring, releasing the brakes, and the auxiliary reservoir is recharged through passages i and k.

Application of the brakes is always produced by a reduction of pressure in the train pipe. In passenger trains each car is provided with a valve through which the train pipe pressure may be released, making possible the operation of the emergency brake from any part of the train. When the engineer's brake valve is used all the air released must pass out through it. As a result the cars nearest the head of the train feel the reduction of pressure first, and have their brakes applied before those following are checked at all. With long heavy trains the time between the action of the front brakes and those at the rear of the train may be several seconds, and severe jolting is caused by the rear cars bumping those ahead. To obviate this difficulty the electro-pneumatic brake has been developed. It includes all the essential parts of the ordinary air brake and can be operated as such in case the current for operating it electrically should fail. A section of the magnetic valve is shown. The coils C′ and the iron core A′ constitute an electro-magnet which is energized by current controlled by the engineer's brake valve. Passage Y connects with the train pipe. Passage X opens into the brake cylinder in the case of the service magnet, and to the atmosphere in the case of the emergency magnet. When the brake valve is moved for a service application of brakes the corresponding valves on all cars are opened simultaneously, and a reduction in pressure occurs at all triple valves throughout the train at the same instant. It has been found, in the case of the New York Subway trains, which are run at very close intervals, that the saving of time in a single stop accomplished by this uniformity of braking is as much as forty seconds.

Air-cells, cavities in the cellular tissue of the stems and leaves of plants which contain air only, the juices of the plants being contained in separate vessels. They are largest and most numerous in aquatic plants, as in the *Vallisneria spiralis* and the *Victoria regia*, the gigantic leaves of which latter are buoyed up on the surface of the water by their means.—The minute cells in the lungs of animals are also called air-cells. There are also air-cells in the bodies of birds. They are connected with the respiratory system, and are situated in the cavity of the thorax and abdomen, and sometimes extend into the bones. They are most fully developed in birds of powerful and rapid flight, such as the albatross.

Air-compressor, any device for increasing the pressure of air above atmospheric pressure by condensing its volume. The use of compressed air in mining and manufacturing operations has attained great importance. The first attempt to apply it practically and on a large scale was in 1861-62 at the Mont Cenis tunnel in the Alps. The



Hydraulic Compressor

compressing plant was designed by Sommeiller and was of the hydraulic type, somewhat like an hydraulic ram, and was operated by water from an elevated source under high pressure. Previous to the adoption of compressed air for drilling in this tunnel the progress made was only 1.5 feet per day. By the use of air drills the speed was increased to 6.0 feet per day. Many of the difficulties encountered in the production and use of compressed air were solved by Sommeiller at Mont Cenis. The first use of compressed air for drilling in America was in the construction of the Hoosac Tunnel on the Boston & Albany Railroad, 1865-66. Since that time it has been adopted for some purpose in nearly every industry. Rock drills, coal-digging machinery, riveting hammers and presses, compressed-air locomotives, hoists, and many other de-

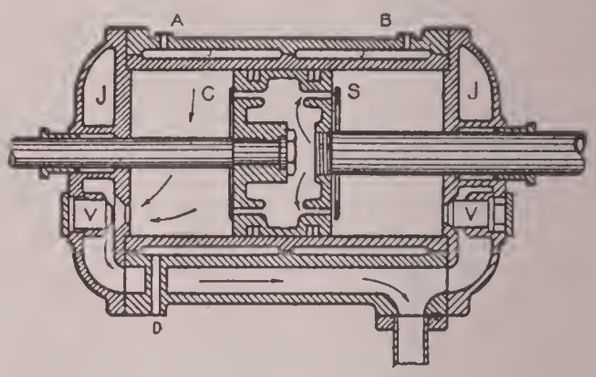
vices are now successfully operated by compressed air.

The direct action of falling water is sometimes used for compressing air. The device used is the hydraulic compressor (shown in section). Water flows into the receiving chamber M through pipe P, and enters the top of the compression pipe C. At the same time air is drawn through small pipes a-a and is carried down pipe C in the form of small bubbles, the velocity of the water being sufficient to prevent their rising to the top again. As the pressure increases with the depth these bubbles are compressed until discharged horizontally at the bottom of C. When the water enters the large separating chamber N its velocity is decreased and the air bubbles disengage and rise to the surface, where they collect in the top of the chamber and discharge through the air main. The pressure to which the air is raised is due to the height h_2 of the discharge water above the water surface in chamber N. The flow of water through the apparatus is determined by the difference h_1 between the levels of the inlet and discharge. Plants of this type are in use in Canada and Western United States, where water supplies at high elevations are obtainable.

Hydraulic compressors of the type used at Mont Cenis are much like the common hydraulic ram (q. v.), the difference being that the entrapped air instead of water is discharged through the delivery pipe.

The most common form of mechanical compressor is the piston type. It very closely resembles the ordinary steam engine, having all the essential parts of the same, but accomplishes an exactly opposite result. In the steam engine steam is expanded behind a piston giving a rotary motion to the flywheels through the medium of connecting rod and crank and producing power for driving other machinery. In the piston compressor the flywheels are turned by some source of power such as a steam or gas engine, electric motor, or waterwheel, either belted or direct connected, and compresses the air behind the piston, discharging it into a pipe line or suitable receiver. A section of the cylinder and piston of a Sergeant compressor is shown in the figure. Usually each end of the cylinder is provided with inlet and exhaust valves. In the example shown, inlet is through the hollow extension of the piston rod and a ring valve on the piston itself.

In case the compressor is to be steam driven, the use of a separate engine, belt or direct connected, introduces a useless duplication of parts. To obviate this the steam and air cylinders are placed on the same bed plate end to end, with one piston rod extending through both, the same guides, connecting rod, crankshaft and flywheels serving for both. Such an arrangement is termed a straight-line compressor. Two such machines set side by side, having a continuous crankshaft through both, but with the crank of one set one-quarter of a revolution ahead of the other, is called a duplex compressor. Just as the steam engine may have two or more cylinders in which the steam is expanded successively, so the compressor may have two or more cylinders in which the air is compressed successively. Such an arrangement is called a two- or three-stage compressor. A straight-line or duplex ma-



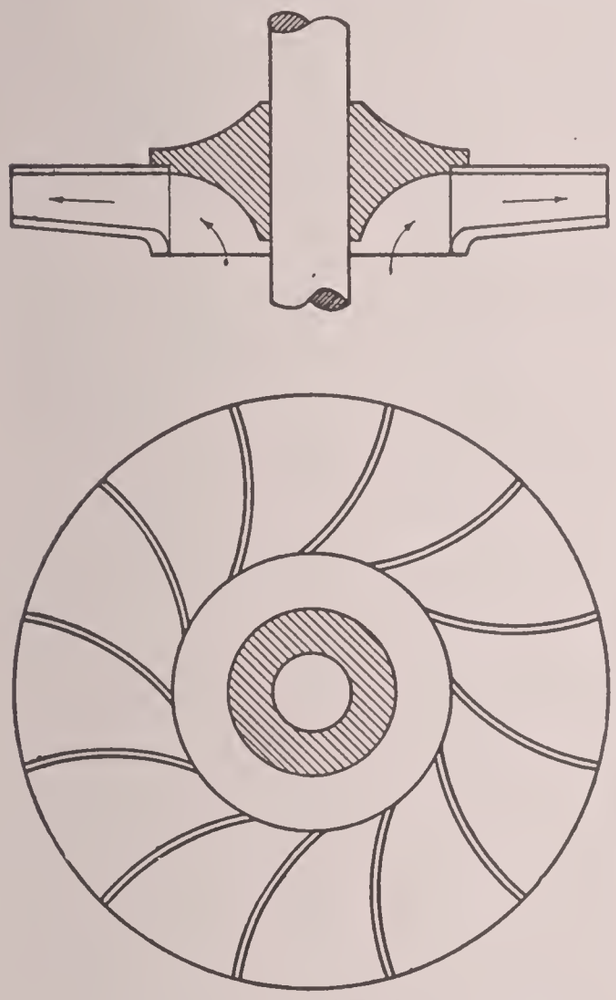
Sergeant Air-compressor (section through cylinder)

chine may have a compound steam end or a staged air end or both. Present day design tends toward staged compressors for pressures above 75 to 90 pounds per square inch. In the larger units a great saving in steam is realized by the use of compound steam cylinders. Since a compressor imposes a load upon an engine, which is very unfavorable to steam economy, this saving is more important than in ordinary steam engine practice. Machines of more than two stages are used for very high pressure work, such as charging the tanks of compressed air locomotives.

Piston compressors may also be classified as wet and dry. The distinction comes from the method employed in disposing of the heat generated by compression. The cylinder of a dry machine has a water jacket like that of an automobile motor, through which a constant circulation is maintained. Since only that part of the air which is in direct contact with the cylinder walls is cooled, the temperature at discharge is high. Even with good jacketing compression to 45 pounds per square inch produces a temperature of 280 degrees Fahr. This rise in temperature indicates that part of the work of the engine is being converted into heat, which

is lost when the air cools in the pipe lines. In compressing to 100 pounds per square inch as much as 26% of the work of the engine is lost.

Some early wet compressors of European make contained a large volume of water in the cylinder, which moved back and forth ahead of the piston. The type has gone out of use because of its bulkiness. In other wet machines a spray of



Sections of Impeller of Turbo-compressor

cold water is injected into the cylinder during compression, the fine particles effectively absorbing the heat. Any dry compressor can be converted into a wet one by the addition of two water jets to each cylinder. The work lost in heat may be as low as 1.6% in a good wet compressor. The objections to this type are: difficulty of lubrication, slow speed and hence large size for a given capacity, high first cost, accumulation of water in pipe lines, which may freeze. Because of these objections the type has become obsolete in America, but is still used to some extent in Europe.

The turbo-compressor is the most recent development in compressing machinery. The low-pressure turbo was developed by Parsons and the high-pressure by Rateau. It consists of one or more impellers mounted on a shaft and surrounded by a casing which separates each impeller from those on either side. The casing is water jacketed and also contains passages so formed that the air discharged by one impeller is led into the intake of the next throughout the length of the machine. The path of the air through an impeller is shown in the section by arrows. The shaft revolves at 3000 to 4000 revolutions per minute and is driven by steam turbine, electric motor, or impulse water-wheel. The high velocity imparted to the air as it passes through the impeller is converted into pressure energy in the guide vanes and passages of the casing. Thus each impeller adds from two to four pounds to the pressure of the air which it receives. Turbo-compressors are most economical in large units and for pressures not exceeding 80 to 90 pounds per square inch. They have been very successfully employed in blast furnace operation (q. v.).

Airedale Terrier (ār′dāl), one of the largest and tallest of the terriers, weighing from 40 to 45 pounds, of a dark grizzle and tan color. A cross of several varieties; originated in England. In some places adopted by the authorities as an adjunct to the police force, and known as police-dog.

Airdrie (ār′drē), an industrial borough of Scotland (Falkirk district), in Lanarkshire, 11 miles east of Glasgow, in the center of a rich iron and coal-mining district, with a large cotton-mill, foundries and machine shops, breweries, etc., and collieries and iron works in its vicinity. Pop. 22,288.

Air-engine, an engine in which air heated, and so expanded, or compressed air, is used as the motive power. It may be said to be essentially similar in construction to the steam-engine, though the expansibility of air by heat is small compared with the expansion that takes place when water is converted into steam. Engines working by compressed air have been found very useful in mining, tunneling, etc., since the compressed air may be conveyed to its destination by means of pipes. In such cases the waste air serves for ventilation and for reducing the oppressive heat.

Air-gun, an instrument for the projection of bullets by means of compressed air. It is generally either in the form of an ordinary gun or of a stout walking-stick.

Airolo (ā-i-rō′lō), a small town of Switzerland, canton Ticino, at the southern end of the St. Gothard Tun-

nel, and the first place on this route at which Italian is spoken. Pop. 1,600.

Air-plants, or EPIPHYTES, are plants that grow upon other plants or trees, apparently without receiving any nutriment otherwise than from the air. The name is restricted to flowering plants (mosses or lichens being excluded) and is suitably applied to many species of orchids. The conditions necessary to the growth of such plants are excessive heat and moisture, and hence their chief localities are the damp and shady tropical forests of Africa, Asia, and America. They are particularly abundant in Java and tropical America.

Air-pump, an apparatus by means of which air or other gas may be removed from an enclosed space or for compressing air within an enclosed space. An ordinary suction-pump for water is on the same principle as the air-pump; indeed, before water reaches the top of the pipe the air has been pumped out by the same machinery which pumps the water. An ordinary suction-pump consists essentially of a cylinder or barrel, having a valve opening from the pipe through which water is to rise and a valve opening into the outlet pipe, and a piston fitted to work in the cylinder (the outlet valve may be in the piston). (See *Pump.*) The arrangement of parts in an air-pump is quite similar. The barrel of an air-pump fills with the air which expands from the *receiver* (that is, the vessel from which the air is being pumped), and consequently the quantity of air expelled at each stroke is less as the exhaustion proceeds, the air getting more and more rarefied. Fig. 1 represents the essential parts of a good air-pump in section. E is the receiver, F is a mercurial

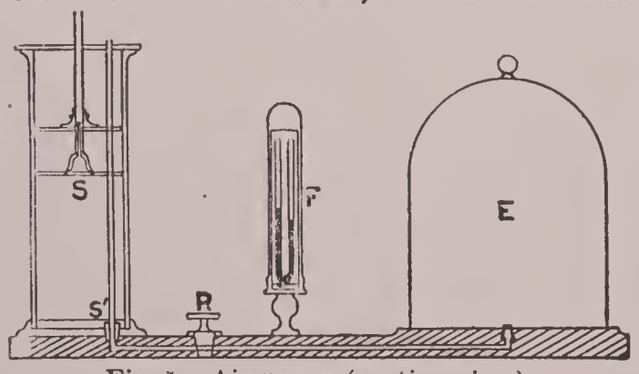


Fig. 1.—Air-pump (section view).

pressure-gauge, which indicates the extent of exhaustion; R is a cock by means of which air may be readmitted to the receiver or by means of which the receiver may be shut off from the pump-barrel. S′ is the inlet valve of the barrel; and, inasmuch as the tension of the air in the receiver after some strokes would not be sufficient to lift a valve, this valve is opened by means of the rod which passes up through the piston. The outlet valve S is kept down by a light spiral spring; it opens when, on the space diminishing in the barrel by the descent of the piston, the contained air has a sufficient pressure. Fig. 2 shows a similar pump in perspec-

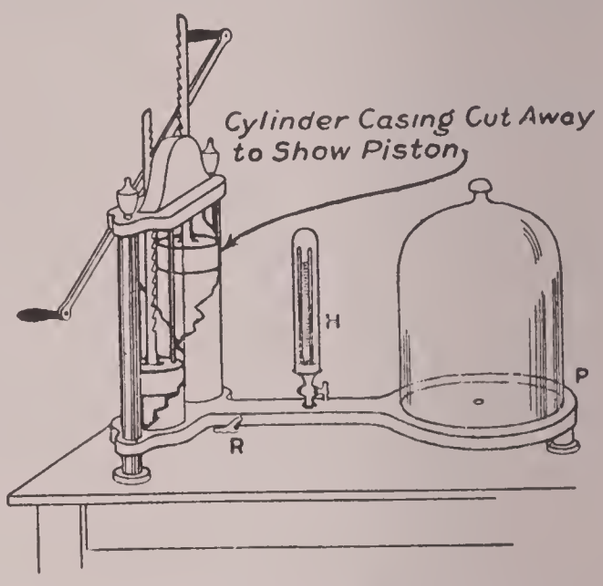


Fig. 2.—Air pump, showing the cylinder casing cut away to show piston.

tive (a double-barreled pump); P is the plate on which the receiver is placed, H the pressure-gauge, R the readmission cock. The pressure-gauge is merely a siphon barometer enclosed in a bell-shaped vessel of glass communicating with the receiver. This barometer consists of a bent tube containing mercury, one end being closed, the other open. As the air is exhausted the smaller is the difference between the height of the mercury in the two branches of the tube, and a complete vacuum would be indicated if the mercury stood at the same level in both. Air-pumps for compressing air are constructed on the same principle but act in the reverse way. Many interesting experiments may be made with the air-pump. If an animal is placed beneath the receiver, and the air exhausted, it dies almost immediately; a lighted candle under the exhausted receiver immediately goes out. Air is thus shown to be necessary to animal life and to combustion. A bell, suspended from a silken thread beneath the exhausted receiver, on being struck cannot be heard. If the bell be in one receiver from which the air is not exhausted, but which is within an exhausted receiver, it still cannot be heard. Air is therefore proved to be necessary to the production and to the transmission of sound. A shriveled apple placed be-

neath an exhausted receiver becomes as plump as if quite fresh. The air-pump was invented by Otto von Guericke, burgomaster of Magdeburg, about the year 1654.

Air-ship. See *Aëronautics.*

Airy (ā're), Sir George Biddell, a distinguished English astronomer, was born at Alnwick, June 27, 1801, and educated at Trinity College, Cambridge, where he was senior wrangler in 1823. At Cambridge he was Lucasian professor of mathematics, and subsequently Plumian professor of astronomy and experimental philosophy, in the latter capacity having charge of the observatory. In 1835 he was appointed astronomer royal, and as such his superintendence of the observatory at Greenwich was able and successful. He resigned this post with a pension in 1881. He wrote largely and made numerous valuable investigations on subjects connected with astronomy, physics, and mathematics; and received many honors from academic and learned bodies. Among separate works published by him may be mentioned *Popular Astronomy, On Sound and Atmospheric Vibrations, A Treatise on Magnetism, On the Undulatory Theory of Optics,* and *On Gravitation.* Died in 1892.

Aisle (īl; from L. *ala,* a wing), in architecture, one of the lateral divisions of a church in the direction of its length, separated from the central portion or nave by piers or pillars. There may be one aisle or more on each side of the nave. The cathedrals at Antwerp and Paris have seven aisles in all. The nave is sometimes called the central aisle. See *Cathedral.*

Aisne (ān), a northern department of France; area, 2868 sq. miles. An undulating, well cultivated, well wooded region, it is watered by the Oise, its tributary the Aisne, and the Marne. The capital is Laon. Other towns are Château-Thierry, St. Quentin, Soissons, Vervins. It was many times a battle ground in the European war (q. v.). Pop. 530,200.

Aivalik (ī-va-lēk'), a seaport on the west coast of Asia Minor, on the Gulf of Adramyti, 66 miles N. by W. of Smyrna. There is an extensive trade in olive oil, soap, cotton, grain, etc. Pop. 25,000, almost wholly Greek.

Aix (āks or ās), a town of Southern France, department Bouches-du-Rhône, on the river Arc, the seat of an archbishop. It is well built, has an old cathedral and other interesting buildings, high-class educational institutions, library (150,000 vols.), museum, etc.; manufactures of cotton, woolens, oil, soap, hats, flour, etc.; warm springs, now less visited than formerly. Aix was founded in 123 B.C. by the Roman consul Caius Sextius Calvinus, and from its mineral springs was called *Aquæ Sextiæ* (Sextian Waters). Between this town and Arles Marius gained his great victory over the Teutons, 102 B.C. In the middle ages the counts of Provence held their court here, to which the troubadours used to resort. Pop. 29,836.

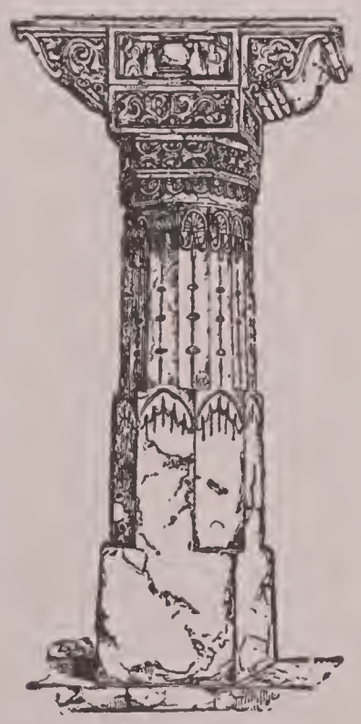
Aix, or Aix-les-Bains (āks-lā-baṇ), a finely situated village of France, department of Savoie, 8 miles north of Chambéry, on the side of a fertile valley, with much-frequented hot springs known to the Romans by the name of *Aquæ Gratianæ,* and with ruins of a Roman triumphal arch, and of a temple of Diana. Pop. 5,437.

Aix-la-Chapelle (āk s-l à-s h à p-e l; Ger. *Aachen*), a city of Rhenish Prussia, 38 miles west by south of Cologne, pleasantly situated in a fine valley; the old city was formerly surrounded by ramparts, now converted into pleasant promenades. It is well built, and though an ancient town has now quite a modern appearance. The most important building is the cathedral, the oldest portion of which, often called the nave, was erected in the time of Charles the Great (Charlemagne) as the palace chapel about 796. It is in the Byzantine style, and consists of an octagon, surrounded by a sixteen-sided gallery and surmounted by a cupola, in the middle being the tomb of Charlemagne. Aix-la-Chapelle, with the adjoining Burtscheid, which may be considered a suburb, is a place of great commerce and manufacturing industry, the chief productions being woolen yarns and cloths, needles, machinery, cards (for the woolen manufacture), railway and other carriages, cigars, chemicals, silk goods, hosiery, glass, soap, etc. A considerable portion of its importance and prosperity arises from the influx of visitors to its springs and baths, there being a number of warm sulphur springs here, and several chalybeate springs, with ample accommodation for strangers. Aix-la-Chapelle was known to the Romans as *Aquisgranum.* It was the favorite residence of Charles the Great, who made it the capital of all his dominions north of the Alps, and who died here in 814. During the middle ages it was a free imperial city and very flourishing. From Louis the Pious in 813 to Ferdinand I in 1531, it was the crowning-place of the emperors and kings, and it was also the seat of numerous diets and

councils. Pop. 156,044. *Congress of Aix-la-Chapelle*, a congress held in 1818, by which the army of the allies in France was withdrawn after France had paid the contribution imposed at the peace of 1815, and independence restored to France.—A treaty of peace concluded at this city, May 2, 1668, as a result of the Triple Alliance, put an end to the war carried on against Spain by Louis XIV in 1667.—The *second peace* of Aix-la-Chapelle, October 18, 1748, terminated the Austrian war of succession.

Ajaccio (å-yȧch'ō), the capital of Corsica, on the southwest coast of the island, on a tongue of land projecting into the Gulf of Ajaccio, the birthplace of Napoleon and the seat of a bishop, with coral and sardine fisheries, and a considerable trade. Pop. 22,264.

Ajanta (a-jan'ta), a village and ravine of India, in the Nizam's dominions, 24 miles north of Assaye. The ravine, 4 miles N. W. of the village, is celebrated for its cave temples,



Pillar at Ajanta.

twenty-nine in number, excavated out of a wall of almost perpendicular rock about 250 feet high. They are all richly ornamented with sculpture, and covered with highly-finished paintings.

Ajax (ā'jäks) (Gr. *Aias*), the name of two Grecian chiefs who fought against Troy, the one being son of Oïleus, the other son of Telamon. The latter was from Salamis, and sailed with twelve ships to Troy, where he is represented by Homer as the boldest and handsomest of the Greeks, after Achilles. On the death of Achilles, when his arms, which Ajax claimed, were awarded to Ulysses, he became insane and killed himself. This is the subject of Sophocles's tragedy *Ajax*.

Ajmeer, AJMIR, or AJMER, (äj-mēr'), a British commissionership in India, Rajputâna, divided into the two districts of Ajmeer and Mairwara; area, 2711 sq. miles. The soil is partly fertile, but there occur large barren sandy plains. Pop. 476,330.—AJMEER, the capital, an ancient city, a favorite residence of the Mogul emperors, is 220 miles S. W. of Delhi, at the foot of Taragarh Hill (2853 feet), on which is a fort. It is surrounded by a wall, and possesses a government college, a mosque that forms one of the finest specimens of early Mohammedan architecture extant, and an old palace of Akbar, now the treasury; trade in cotton, sugar, salt, etc. Pop. 73,839.

Ajowan (a-jō-wan') (*Ptychōtis Ajowan*), an umbelliferous plant cultivated in India, Persia, and Egypt, the seeds of which are used in cookery and in medicine, having carminative properties.

Ajuga, a genus of plants. See *Bugle*.

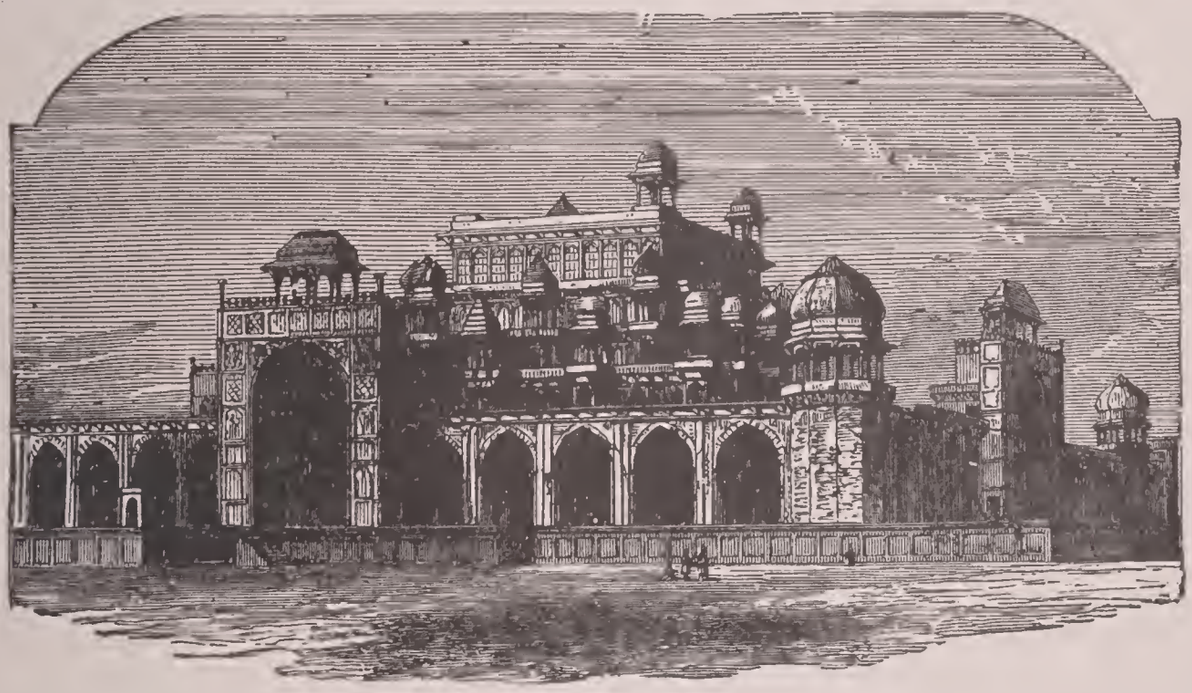
Ajutage (aj'ö-tāj), a short tube of a tapering shape fitting into the side of a reservoir to regulate the discharge of the water. Also, the nozzle of a tube for regulating the discharge of water to form a jet d'eau.

Akabah (ä'kä-bä), GULF OF, an arm of the Red Sea, on the east side of the Peninsula of Sinai, which separates it from the Gulf of Suez; nearly 100 miles long. The village of Akabah, at the northern extremity of the gulf, is supposed to be the *Ezion-geber* of the Old Testament.

Akaroid (āk'a-roid) RESIN, a resin obtained from some of the grass-trees of Australia, used in varnishes.

Ak'bar (that is, 'very great'), a Mogul emperor, the greatest Asiatic prince of modern times. He was born at Amerkote, in Sind, in 1542, succeeded his father, Humayun, at the age of thirteen, and governed first under the guardianship of his minister, Beyram, but took the chief power into his own hands in 1560. He fought with distinguished valor against his foreign foes and rebellious subjects, conquering all his enemies, and extending the limits of the empire further than they had ever been before, although on his accession they embraced only a small part of the former Mogul empire. His government was

remarkable for its mildness and tolerance towards all sects; he was indefatigable in his attention to the internal administration of his empire, and instituted inquiries into the population, character, and productions of each province. The result of his statistical labors, as well as a history of his reign, were collected by his minister, Abul Fazl, in a work called *Akbar-Nameh* (Book of Akbar), the third part of which, entitled *Ayini-Akbari* (Institutes of Akbar), was published in an English translation at Calcutta (1783–86, three vols.), and reprinted in London. He died in 1605. His mausoleum at Secundra, near Agra, is a fine example of Mohammedan architecture.



Mausoleum of the Emperor Akbar at Secundra.

Akee' (*Blighia sapida*), a tree of the nat. order Sapindaceæ, much esteemed for its fruit. The leaves are somewhat similar to those of the ash; the flowers are small and white, and produce in branched spikes. The fruit is lobed and ribbed, of a dull, orange color, and contains several large black seeds, embedded in a succulent and slightly bitter arillus of a pale-straw color, which is eaten when cooked. The akee is a native of Guinea, from whence it was carried to the West Indies by Captain Bligh in 1793.

À Kempis, Thomas. See *Thomas à Kempis.*

Aken (ä'ken), a Prussian town, province of Saxony, on the left bank of the Elbe, with manufactures of tobacco, cloth, beet-root sugar, leather, etc. Pop. 9680.

Akenside (ā'ken-sīd), Mark, a poet and physician, born in 1721, at Newcastle-upon-Tyne; died in London in 1770. He was the son of a butcher, and was sent to the University of Edinburgh to qualify himself for the Presbyterian ministery, but chose the study of medicine instead. After three years' residence at Edinburgh he went to Leyden, and in 1744 became Doctor of Physic. In the same year he published the *Pleasures of Imagination*, which he is said to have written in Edinburgh. Having settled in London in 1748, he became a fellow of the Royal Society and was admitted into the College of Physicians. In 1759 he was appointed first assistant and afterwards head physician to St. Thomas's hospital. In his later years he wrote little poetry, but published several medical essays and observations.

Akhaltzik (a-*h*ål-tsik'), a town of Russian Armenia, in the government of Tiflis, 97 miles W. of Tiflis, with a citadel. Taken by the Russians in 1828. Pop. 15,387.

Ak-Hissar (äk-his-sar') ('White Castle'), a town in Asia Minor, 58 miles N. E. of Smyrna, occupying the site of the ancient Thyatira, relics of which city are here abundant. It was an important station on the Roman road from Pergamum to Laodicea, and was the seat of one of the 'Seven Churches' of Asia. Pop. 20,000.

Akhtyrka (å*h*-tir'kå), a cathedral town of southern Russia, gov. Kharkov, with a good trade and some manufactures. Pop. 31,918..

Akkas, a dwarfish race of Central Africa, dwelling in scattered settlements to the northwest of Lake Albert, about lat. 3° N., lon. 29° E. Their height averages about 4½ feet; they are of a brownish or coffee color; head large, jaws projecting (or prognathous), ears large, hands small. They are timid and suspicious, and live almost entirely by the chase, being exceedingly skilful with the bow and arrow. They form a branch of the primitive pygmy negroid race found in many parts of Africa. The Akkas are now confined to the Belgian Congo for the most part.

Akkerman (åk-ker-män'), a town and port of Bessarabia, Roumania, near the mouth of the Dniester. The vicinity produces quantities of salt and also fine grapes and other fruits. There is a good harbor and steamer communication with Odessa, 30 miles distant. It belonged to the Venetians at one time, then to the Genoese, the Turks and the Russians. Russia held it from 1826 until 1919, when it passed to Roumania. Pop. 40,400.

Akmolinsk (ak-mȧ-lyēnsk'), a Russian province in Central Asia, largely consisting of steppes and wastes; the rivers are the Ishim and Sari-Su; and it contains the larger part of Lake Balkash. Area of 225,074 sq. m. Pop. 1,546,500.—AKMOLINSK, the capital. Pop. 10,000.

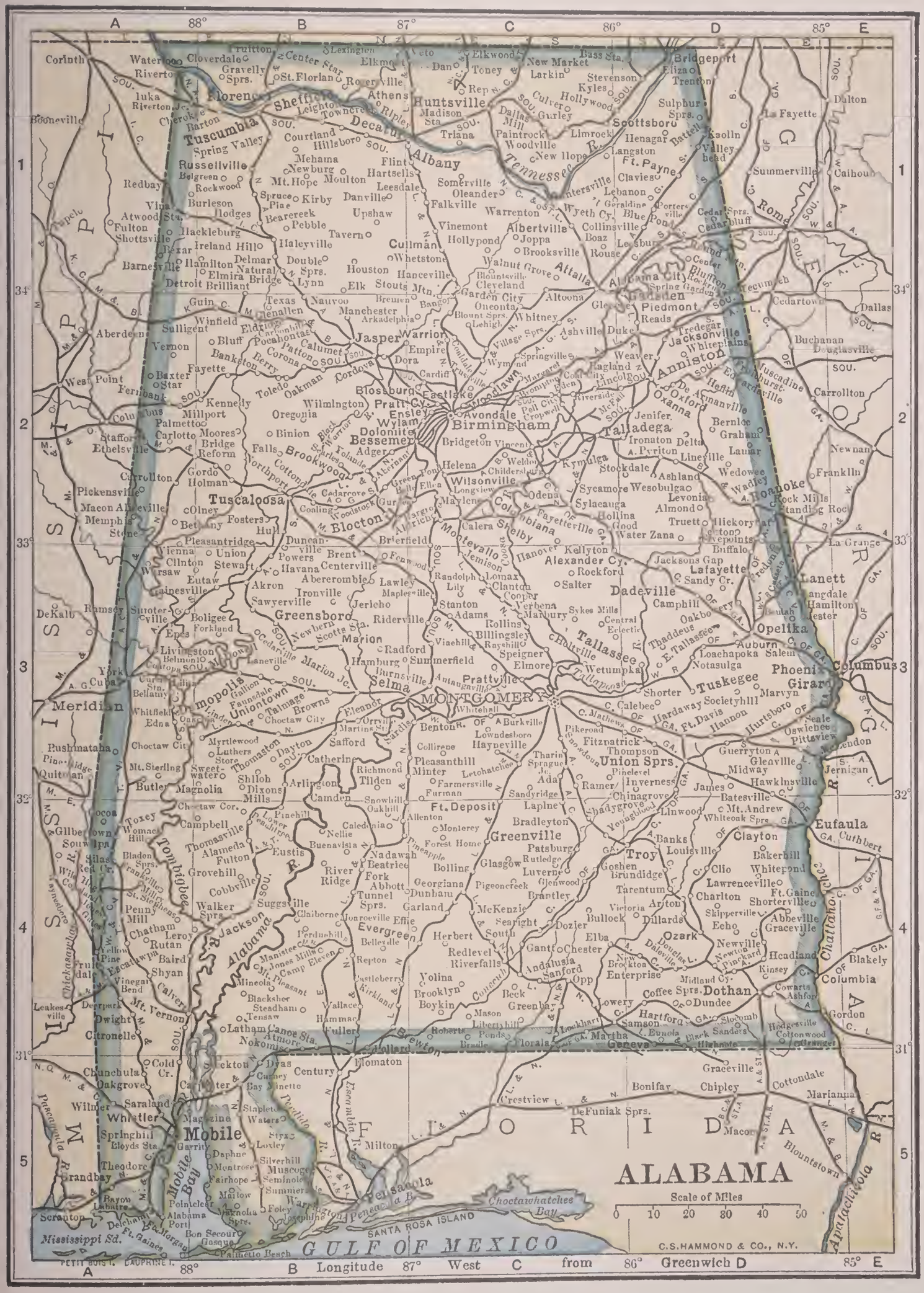
Akron (ak'run), a city, county seat of Summit county, Ohio, on the Ohio Canal and several railroads, 35 miles S. of Cleveland. It is a great industrial center and has had a phenomenal growth. Its rubber interests, founded by Dr. B. F. Goodrich in 1869, are now the greatest in the world. The value of Akron's rubber products in 1914 was $93,980,000; in 1919, $227,119,275. The manufacture of motor trucks is another important industry, as is also the manufacture of rolled oats. Other industries include pottery, fishing tackle, printing, automobiles, agricultural implements, etc. It is the seat of Buchtel College and the Akron Municipal University (organized 1913). Pop. (1900) 42,728; (1910) 69,067; (1920) 208,435.

Aksu (äk-sū') ('white water'), a town of Eastern Turkestan, 300 miles from Kashgar, in the valley of the Aksu. It is an important center of trade between Russia, China, and Tartary, and has manufactures of cotton cloth, leather, and metal goods. Formerly the residence of the kings of Kashgar and Yarkand. Pop. 15,000 to 20,000.

Akyab (äk-yäb'), a seaport of Lower Burmah, capital of the province of Arracan, at the mouth of the river Kuladan or Akyab, of recent upgrowth, well built, possessing a good harbor, and carrying on an important trade, its chief exports being rice and petroleum. Pop. 38,000.

Alabama (al-a-bȧ'ma), one of the United States, bounded by Tennessee, Georgia, Florida, the Gulf of Mexico, and Mississippi; area, 51,998 square miles. The southern part, bordering on the Gulf of Mexico and Florida, is low and level, and wooded largely with pine, hence known as the 'pine-woods region,' the middle is hilly, with some tracts of level sand or prairies; the north is broken and mountainous. The state is intersected by the rivers Alabama, Tombigbee, Mobile, Coosa, Tallapoosa, Tennessee, etc., some of them navigable for several hundred miles. The soil is various, being in some places, particularly in the south, sandy and barren, but in most parts is fertile, especially in the river valleys and in the center, where there is a very fertile tract known as the 'cotton belt.' The climate in general is warm, and in the low-lying lands skirting the rivers is rather unhealthy. In the more elevated parts it is healthy and agreeable, the winters being mild and the summers tempered by breezes from the Gulf of Mexico. The staple production is cotton, especially in the middle and south, where rice and sugar are also grown; in the north corn is the principal crop. Alabama possesses extensive beds of iron ore, coal and limestone. The combined iron and steel industry, including blast furnaces and rolling mills and steel works, exceed in value of products any other industry. Lumber and timber products come next; then cotton goods, oil and cottonseed, coke. The many small streams and waterfalls afford excellent water power.

Alabama was admitted to the Union on December 14, 1819. It sends 10 representatives to Congress. The state capital is Montgomery. Birmingham is the chief seat of iron and steel manufacture; Mobile is the chief port. The principal institutions for higher learning are the University of Alabama (q. v.) at Tuscaloosa; Alabama Polytechnic Institute (q. v.) at Auburn; Southern University (Methodist Episcopal South, founded 1859) at Greensboro; Howard College (Baptist, founded 1842); Birmingham-South (founded 1856) at Birmingham; Judson (founded 1838) at Marion; Payne (founded 1889) at Selma; Spring Hill (founded 1829) at Spring Hill; Talladega (founded 1867) at Talledega; Tuskegee Institute (q. v.) in Macon county; Woman's College of Alabama


ALABAMA
Scale of Miles
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C.S.HAMMOND & CO., N.Y.
GULF OF MEXICO
SANTA ROSA ISLAND
Choctawhatchee Bay
Pensacola
Mobile
Mobile Bay
Tuscumbia
Florence
Sheffield
Decatur
Huntsville
Albany
Tennessee R.
Scottsboro
Bridgeport
Rome
Gadsden
Anniston
Jasper
Warrior
Birmingham
Bessemer
Tuscaloosa
Blocton
Greensboro
Marion
Selma
MONTGOMERY
Prattville
Tallassee
Dadeville
Lafayette
Opelika
Lanett
Columbus
Phoenix
Girard
Tuskegee
Union Sprs.
Troy
Greenville
Ft. Deposit
Evergreen
Brewton
Dothan
Eufaula
Columbia
Gordon
Ozark
Geneva
Florala
Elomaton
Milton
Pensacola
Meridian
Tombigbee R.
Alabama R.
Chattahoochee R.
Apalachicola R.
Mississippi Sd.
Pascagoula R.
Chickasawha R.
Tallapoosa R.
Coosa R.
Escambia R.
Perdido R.
Alabama City
Attalla
Albertville
Cullman
Hartselle
Moulton
Russellville
Fayette
Carrollton
Gordo
Pickensville
Eutaw
Livingston
Cuba
Gilbertown
Chatham
Mt. Vernon
Dwight
Citronelle
Chunchula
Oakgrove
Saraland
Whistler
Springhill
Theodore
Grandbay
Scranton
Bayou Labatre
Pointclear
Alabama Port
Bon Secour
Gasque
Palmetto Beach
Mississippi Sd.
Ft. Gaines
Dauphine I.
Petit Bois I.
Longitude West from Greenwich
A B C D E
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34° 33° 32° 31°

(founded 1908) at Montgomery; St. Bernard (Roman Catholic) at Saint Bernard. There are several agricultural schools and normal schools. Pop. (1900) 1,828,697; (1910) 2,138,093; (1920) 2,347,295.

Alabama, a river of the United States in the State of Alabama, formed by the junction of the Coosa and the Tallapoosa. After a course of 312 miles it joins the Tombigbee and assumes the name of Mobile.

Alabama, THE, a ship built at Birkenhead, England, to act as a privateer in the service of the Confederate States of North America during the Civil war. She was a wooden screw steamer with two engines of 350 horse-power each, 1040 tons burden, and carried eight 32-pounders. Before she was launched her destination was made known to the British government, but delay in ordering her detention permitted her to escape, the order reaching Liverpool one day late. She received her armament and stores at the Azores, and entered on a destructive career, capturing and burning merchant vessels, till she was sunk in a fight with the Federal war steamer *Kearsarge*, off Cherbourg, 19th June, 1864.

Alabama City, a city of Etowah county, Alabama, 56 miles N. of Birmingham, with cotton and steel mills. Farm products in vicinity are cotton, corn, wheat, oats, etc. Pop. (1920) 5432.

Alabama Claims, The. As early as the winter of 1862 the United States government declared that they held themselves entitled at a suitable period to demand full compensation from Britain for the damages inflicted on American property by the *Alabama* and several other cruisers that had been built, supplied, or recruited in British ports or waters. A court of arbitration made up of representatives of Italy, Brazil, Switzerland, Great Britain and the United States, met in Genoa Dec. 15, 1871, to adjudicate the claims, and decreed that Great Britain must pay an indemnity of $15,000,000.

Alabama Polytechnic Institute, a State institution at Auburn, Alabama, organized in 1872. There are courses in agriculture, pharmaceutics, chemistry, engineering, etc. The library has 25,000 volumes; number of students, 800.

Alabama, University of, a State co-educational institution at Tuscaloosa, Alabama, organized in 1831. It comprises colleges in arts, sciences, engineering, law, education, medicine and pharmacy, and a summer school. In 1920 there were 1860 students, with a faculty of 125.

Alabaster (a-la-bas'ter), properly a massive form of gypsum, hydrous calcium sulphate. Another form exists as carbonate of lime. The latter is the alabaster of the ancients, generally speaking, and the former the alabaster of the present day. They are distinguished from each other by their relative hardness, modern alabaster being so soft that it can readily be scratched with the nail, while the ancient or Oriental alabaster resists such treatment. The finer kinds of modern alabaster are quarried in Italy, where, after treatment, it is often sold for Carrara marble. Oriental alabaster, known also as onyx marble, or simply onyx, occurs as either a stalagmitic deposit or a kind of travertine, and is found in the United States, Mexico and northern Africa. The banded appearance of onyx is due to its deposition in successive layers from springs of calcareous waters.

Aladdin (a-lad'in), the hero of the story, *Aladdin and His Wonderful Lamp*, in the *Arabian Nights Entertainments*. Aladdin is a poor boy, who becomes rich through a magic lamp.

Alagoas (ä-lä-gō'as), a maritime state of Brazil, extending from Pernambuco State on the north to the Sao Francisco River on the south; formerly part of Pernambuco. Rubber and sugar are among the industries. Area, 22,577 sq. miles; pop. 1,050,744. Capital, Maceio.

Alais (ä-lā), a town of Southern France, department of Gard, 25 miles N. W. of Nimes, with coal, iron, and lead mines, and chalybeate springs. Pop. 28,831.

Alajuela (ä-lä-*h*u-ā'lä), a city of Costa Rica, capital of a province of the same name, about 12 miles from San José. It is in the center of an important coffee district. Pop. 6000.

Alamanni. See *Alemanni*.

Alamanni (ä-lä-män'i), LUIGI, an Italian poet, of noble family, born at Florence in 1495. Suspected of conspiring against the life of Cardinal Giulio Medici (later Clement VII) he fled to France. Died 1556.

Alameda (a-la-mē'da), a residential city of Alameda county, California, situated on the Bay of San Francisco, about 8 miles from the city, with which it is connected by ferries. It is celebrated for its beautiful streets and fine bathing beaches, parks and gardens. Pop. (1910) 23,383; (1920) 28,806.

Alamo (äl′a-mō), THE, a Franciscan mission building in San Antonio, Texas, built about 1730. During the war for Texan independence it was used as a fort. In March, 1836, Santa Anna crossed the Rio Grande at the head of 6000 men and stormed the Alamo fort, slaughtering its inhabitants (about 180), among whom was the famous pioneer and wit, Davy Crockett.

Alamos (a′la-mōs), a town of Sonora, Mexico, center of a lead and copper mining district. Pop. about 10,000.

Aland (ō′lan) ISLANDS, an archipelago at the mouth of the Gulf of Bothnia, belonging to Finland; total area, 550 square miles; largest island, Aland, 247 square miles. They belonged to Sweden, but were seized by Russia in 1809 and incorporated in the government of Abo-Bjorneborg, Finland. In 1917 Finland declared her independence, and in 1921 the Aland Islands were awarded to Finland by the Council of the League of Nations, despite Swedish protests. Fishing and agriculture are the chief industries. Pop. about 25,000.

Alans (ā′lanz) or ALANI, an ancient nomad people of Europe and Asia, who appeared in the first century B. C. and disappeared as a distinct race in the sixth century A. D.

Alarcon ((ä-lär-kon′), HERNANDO DE (1466-1540), a Spanish soldier, custodian of Francis I.

Alarcon (ä-lar-kon′), DON FERNANDO DE (1466-1541), a Spanish navigator, the first European to explore the Colorado River.

Alarcon y Mendoza (ä-lar-kōn′ e men-do′thä), DON JUAN RUIZ DE, one of the most distinguished dramatic poets of Spain, born in Mexico about 1580. He went to Spain in 1600; returned to Mexico in 1608, and went again to Spain in 1611. In 1628 he published a volume containing eight comedies, and in 1634 another containing twelve. His *Trejador de Segovia* (Weaver of Segovia) and *Las Paredes Oyen* (Walls have Ears) are still performed on the Spanish stage. He died in 1639.

Alarcos (ä-lär-kos′), or ALARCON, a small town in Cuenca, Spain, situated on a rock in the Jucar. Here, in 1195, the Christians suffered a bloody defeat at the hands of the Mussulmans.

Alaric I (al′ar-ik), King of the Visigoths, was born about the middle of the fourth century, and is first mentioned in history in A. D. 394, when Theodosius the Great gave him the command of his Gothic auxiliaries. The dissensions between Arcadius and Honorius, the sons of Theodosius, inspired Alaric with the intention of attacking the Roman empire. In 396 he ravaged Greece, from which he was driven by the Roman general Stilicho, but made a masterly retreat to Illyria, of which Arcadius, frightened at his successes, appointed him governor. In 400 he invaded Italy, but was defeated by Stilicho at Pollentia (403), and induced to transfer his services from Arcadius to Honorius on condition of receiving 4000 lbs. of gold. Honorius having failed to fulfil this condition, Alaric made a second invasion of Italy, during which he besieged Rome thrice. The first time (408) the city was saved by paying a heavy ransom; the second (409) it capitulated, and Honorius was deposed, but shortly afterwards restored. His sanction of a treacherous attack on the forces of Alaric brought about the third siege, and the city was taken 24th August, 410, and sacked for six days, Alaric, however, doing everything in his power to restrain the violence of his followers. He quitted Rome with the intention of reducing Sicily and Africa, but died at Cosenza in 410.

Al′aric II, King of the Visigoths from 484 to 507 A.D. At the beginning of his reign the dominions of the Visigoths were at their greatest extent, embracing three-fourths of the modern Spain and all Western Gaul to the south of the Loire. His unwarlike character induced Clovis, King of the Franks, to invade the kingdom of the Visigoths. In a battle near Poictiers (507) Alaric was slain and his army completely defeated. The Breviarium Alaricianum, a code of laws derived exclusively from Roman sources, was compiled by a body of Roman jurists at the command of this King Alaric.

Alarm (a-lärm′), in military language a signal, given by beat of drum, bugle-call, or firing of a gun, to apprise a camp or garrison of a surprise intended or actually made by the enemy. A place, called the *alarm-post*, is generally appointed at which the troops are to assemble when an alarm is given.—*Alarm* is also the name given to several contrivances in which electricity is made use of, as a *fire-alarm*, by which intelligence is at once conveyed to the proper quarter when a fire breaks out; a *burglar-alarm*, an arrangement of wires and a battery in a house intended to set a bell or bells ringing should a burglar attempt to gain entrance. An *alarm-clock*, one which can be set so as to ring loudly at a certain hour to wake from sleep or excite attention.

Ala-Shehr (ä-lä-shār′; ancient *Philadelphia*), a town in Turkey in Asia, 76 miles east of Smyrna.

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THE TEXAS CRADLE OF LIBERTY

The Alamo, at San Antonio, sacred to the memory of David Crockett and the gallant defenders who in 1836 'gave their lives that their country might live'. The battle cry that led to ultimate victory over the Mexicans was: 'Remember the Alamo.'

ALASKA
ARCTIC OCEAN
BERING SEA
PACIFIC OCEAN
GULF OF ALASKA
ASIA
SIBERIA
CANADA
DOMINION
ROCKY MOUNTAINS
YUKON
BRITISH COLUMBIA
ALEXANDER ARCHIPELAGO
ALEUTIAN ISLANDS
Scale of Miles
0 50 100 200 300
CONTINUATION OF ALEUTIAN IS.
Same Scale as Main Map
Longitude West from 160° Greenwich

famous as the seat of one of the first Christian churches, and still having a vast number of interesting remains of antiquity, consisting of fragments of beautiful columns, sarcophagi, fountains, etc. It is a place of some importance, carrying on a thriving trade by caravans, chiefly with Smyrna. Pop. about 22,000.

Alaska (a-las'ka), a territory belonging to the United States, comprising all that portion of the northwest of North America which lies west of the 141st meridian of west longitude, together with an irregular strip of coast land (and the adjacent islands), extending south to lat. 54° 40′ N., and lying between the British territories and the Pacific; total area, about 577,390 sq. m The territory is watered by several rivers, the principal of which is the Yukon, a river of about 2000 miles in total length; 1500–1600 miles within the territory. The principal mountains (among which are a number of active volcanic peaks) are Mounts McKinley (20,464 ft.), Wrangell, and Fairweather. The climate of the interior is very severe in winter; in summer the heat is intense; on the Pacific coast it is mild but moist. Alaska produces an abundance of excellent timber, and has proved capable of growing oats, rye, barley and some other garden and field products. Numbers of fur-bearing animals abound, such as the fur-seal, sea-otter, beaver, fox, mink, marten, etc.; and the fur trade has long been valuable. The coasts and rivers swarm with fish, and salmon, herring, halibut, and cod are caught and exported, the salmon fisheries being of great importance. Gold exists in many localities, especially near Nome and the Seward Peninsula, the annual product reaching about $20,000,000. Very rich deposits of coal have been found, of excellent quality, and copper is abundant. The aboriginal inhabitants consist of Eskimos and Indians. Alaska formerly belonged to Russia, but was made over to the United States in 1867 for a sum of $7,200,000. A long-pending Alaskan boundary dispute between Canada and the United States was settled in favor of the latter in 1903. The seat of government is Juneau on Gastineau Channel. In 1914, Congress authorized the construction of a railroad costing $35,000,000; increased in 1919 to $52,000,000. Pop. (1910) 64,366; (1920) 54,718, including 25,508 natives.

Alatau (å-lå-tou'), the name of three considerable mountain ranges of Central Asia, on the Russian and Chinese frontiers.

Alatyr (å-lå-tir'), a town in Simbirsk, Russia, at the confluence of the Alatyr with the Sura. Pop. 14,000.

Alauda (a-lą'dą), a genus of insessorial birds, which includes the larks. See *Lark*.

Alava (ä'lä-vä), a hilly province in the north of Spain, one of the three Basque provinces; area, 1207 sq. m.; covered by branches of the Pyrenees, the mountains being clothed with oak, chestnut and other timber, and the valleys yielding grain, vegetables, and abundance of fruits. There are iron and copper mines, and inexhaustible salt springs. Capital, Vitoria. Pop. 96,385.

Alb (from L. *albus*, white), a clerical vestment worn by priests while officiating in the more solemn functions of divine service. It is a long robe of white linen reaching to the feet, bound round the waist by a cincture, and fitting more closely to the body than the surplice.

Alb.

Al'ba, the name of several towns in ancient Italy, the most celebrated of which was Alba Longa, a city of Latium; according to tradition, built by Ascanius, the son of Æneas, 300 years before the foundation of Rome; at one time the most powerful city of Latium. It ultimately fell under the dominion of Rome, when the town was destroyed, it is said. In later times its site became covered with villas of wealthy Romans.

Alba (anciently *Alba Pompeia*), a town of Northern Italy, about 30 miles S. E. of Turin, is the see of a bishop, has a cathedral, bishop's palace, church with fresco paintings by Perugino, etc. Pop. 13,900.

Alba, Duke of. See *Alva*.

Albacete (ål-bä-thā'tā), a town in Southern Spain, capital of the province of the same name, 106 miles N. N. W. of Cartagena, with a considerable trade, both direct and transit, and manufactures of knives, daggers, etc. Pop. 21,512.—The province has an area of 5737 sq. miles, and a pop. of 237,877.

Alba Longa. See *Alba*.

Alban (al'ban) Saint, the traditionary proto-martyr of Britain, who flourished in the third century, was, it is said, converted from paganism by a confessor whom he had saved from his

persecutors, and refusing to sacrifice to the gods was executed outside of the city of Verulamium (St. Albans) in 285 or 305.

Albani, Madame Emma, the professional name of Marie Louise Emma Cecile Lajeunesse, a celebrated Canadian dramatic soprano, born at Chambly, near Montreal, in 1852. She studied at Paris and Milan and made her début in *La Sonnambula* at Messina in 1870. She has sung in opera at New York, Berlin, Paris, and other cities in various parts of the world. She was honored by Orders of Merit from England, Denmark and Germany, besides two Jubilee medals and a Victoria Badge. In 1911 she published her *Forty Years of Song.*

Albani (àl-bä'nē), Francesco, a famous Italian painter, born at Bologna in 1578, died in 1660. He had as teachers the Flemish painter Calvaert and the Caracci. Among the best known of his compositions are the *Sleeping Venus, Diana in the Bath, Danaë Reclining, Galatea on the Sea, Europa on the Bull.*

Albania (al-ba'ne-a), nominally an independent principality extending along the western part of the Balkan peninsula from the southern frontier of Montenegro to the northern boundary of Greece. The boundary in the east is formed by a range of mountains and the country is composed of at least nine ridges of hills, of which six are in Lower or Southern Albania (ancient Epirus) and the remainder in Central and Upper Albania. There are no large rivers, and in summer many of the streams are completely dry. The Drin is the largest. Ochrida and Scutari are the principal lakes. Among trees Albania has many species of oak, poplar, hazel, cypress and laurel. The vine flourishes, together with the orange, almond, fig, mulberry, and citron. Chief exports are live stock, wool, hides, timber and oil. The principal towns are Scutari, Prevesa, Avlona, and Durazzo.

The population of Albania proper is less than 1,000,000, but within the broader limits of the Albanian country there are about 2,000,000 souls, of whom 250,000 are Serbs. Most of them are Mohammedans. Apparently the Albanians are the most ancient race in southeastern Europe. They have managed to maintain a measure of independence from earliest times. In the Middle Ages they offered resistance to the Greeks and subsequently to the Turks. Their most famous warrior was Scanderbeg (George Castriota), who fought thirteen campaigns from 1444 to 1466 and overwhelmed great armies of the Ottoman empire. (See *Scanderbeg.*) On his death the Venetians came to the aid of the Albanians, but they, with their Montenegran allies, were defeated, and from 1571 the nominal authority of the Porte was acknowledged, but never effectively established, succeeding centuries presenting a record of conflicts between the tribesmen and the Turks and between the various religious sects. In 1807 Ali Pasha, of Tepelen, established a practical sovereignty over Albania. He made Jannina his capital and introduced a measure of civilization. He was known as the Lion of Jannina; an able but a cruel and unscrupulous man. He renounced allegiance to the sultan, but was overthrown in 1822. In 1878 an attempt was made to transfer Albanian territory to Austria-Hungary, Serbia and Montenegro, but the Albanian leaders displayed such a spirit of militant independence that the scheme was dropped. In 1880 the powers decreed that Greece should profit at Albania's expense, but the southern Albanians united to resist the territorial cessions.

The Balkan war has been attributed to this spirit of independence which in 1911 culminated in the revolt of the Malissori tribe against the Turks. Bulgaria, Serbia, Montenegro and Greece attacked Turkey (see *Balkan War*) and when peace was signed May 30, 1913, Turkey agreed to give up large stretches of country, and her overlordship of Albania ceased. The new principality of Albania came into being in October, 1913, at an international council consisting of representatives of Great Britain, Germany, Russia, France, Austria-Hungary, and Italy. Prince William of Wied, a German subject and a relation of Queen Elizabeth of Rumania, was nominated as first prince of the autonomous principality—Mpret of Albania, as he was styled.

At the beginning of the European war (*q. v.*) the Mpret was menaced by an uprising in the municipality and in July, 1914, had appealed to the powers for help. Help might have been forthcoming, but the outbreak of the great war absorbed the thought of the powers, and the German princeling, Mpret of Albania, sailed from Durazzo for Italy, leaving the country to its own resources. An attempt was made to place the son of the former Sultan, Abdul Hamid, on the vacant throne, but Essad Pasha, who had been Minister of War, assumed control and gathered about him an army of 10,000 and had himself appointed President of the provisional government. A revolution overthrew Essad Pasha, and Italy and Greece took a hand in the affairs of the country.

In October Italian forces occupied Avlona, and a little later Greece occupied several districts in Epirus. In 1915 the Serbians established themselves in Albania, after retreating before the Teutonic and Bulgarian armies, and planned to set up a military base there. The Austro-Bulgarian forces occupied Durazzo in February, 1916. Two declarations by foreign powers, declaring the autonomy of Albania, under their respective protection, came in 1917: one by Austria-Hungary in January, and the second by Italy in June. France was reported to have occupied towns in Albania, which apparently becomes a prize of war unless the powers agree on autonomy under international control.

Albany, capital of New York State and an important railroad and commercial city, on the west bank of the Hudson, 145 miles north of New York City, with which it has direct steamboat communication by day and night lines. The Erie and Champlain Canals and the numerous railroad lines, West Shore, New York Central, and Delaware and Hudson, centering here from all directions greatly contribute to the growth and prosperity of the city, which carries on a large trade in iron, wood and brass manufacture, printing and engraving, collar and cuff manufacture, and clothing.

Albany was settled by the Dutch in 1610-14, and the older houses are in the Dutch style, with the gable ends to the street. The old Van Rensselaer manor house, which was built in 1765, is now on the campus of Williams College at Williamstown, Mass. The old Schuyler house is used as a museum. It was at Albany that the first general Congress of the colonies was held, on which occasion plans were made for the union. (See *Albany Convention.*) The most striking building in Albany is the Capitol, built in 1871 at a cost of $24,000,000. It is built of Maine granite, in the Renaissance style, and is ranked among the noteworthy edifices of the country. Other notable buildings are the State Education building, the State Hall for the public offices, the Geological and Agricultural Hall, the Union Station, the Hotel Ten Eyck, the Albany Academy, the State Armory, the Cathedral of the Immaculate Conception, with its twin spires, the Cathedral of All Saints, the North Dutch Church and St. Peter's Church. Population (1910) 100,253; (1920) 113,344.

Albany, a city and the county seat of Linn county, Oregon, on the Willamette River, 80 miles southwest of Portland. It is in the center of the lumber country and in addition to numerous sawmills it has an extensive trade in grain, flour, sandstone, and fruits. Power is furnished by the Willamette River. Among the principal buildings are Albany College, a Presbyterian institution, opened in 1867, the Carnegie Library, Albany Academy, and a number of fine churches. The population in 1920 was 4840.

Albany, formerly NEW DECATUR, a city of Morgan county, Alabama, on Tennessee River, adjoining Decatur. Shipping point for N. Alabama. Here are the Louisville and Nashville R. R. shops. Other industries are tanneries, silk mills, cotton compresses, broom factory, lumber plants. Pop. 7652.

Albany, a river in the province of Ontario, Canada. It rises in Lake St. Joseph and flows into James Bay at Fort Albany. It separates Ontario from Keewatin.

Albany, a seaport in the Commonwealth of Australia, and a popular health resort. It is in Plantagenet county, Western Australia, and is a port of call for steamers taking the Cape Route, the harbor being one of the finest in the state. Population about 4000.

Albany, a city, county seat of Dougherty county, Georgia, on Flint River, 107 miles S. S. W. of Macon. It is an important railroad terminal, ships cotton by water, being at the head of navigation, and has several manufacturing industries. It has become a health resort. Pop. (1910) 8190; (1920) 11,555.

Albany, LOUISA MARIA CAROLINE, COUNTESS OF, a princess of the Stolberg-Gedern family, was born in 1753, and married, in 1772, the Pretender, Charles Edward Stuart, after which event she bore the above title. To escape from the ill-treatment of her husband she retired, in 1780, to the house of her brother-in-law at Rome, where she met the poet Alfieri, whose mistress she became. (See *Alfieri.*) She died at Florence in 1824.

Albany Convention, an assembly of the representatives of the seven northern British-American Colonies (Massachusetts, Connecticut, Rhode Island, New Hampshire, New York, Pennsylvania and Maryland), called together in 1754 at Albany, New York, to discuss a plan of intercolonial union. The plan as presented was never approved either by the Colonies or by the Crown, as it was regarded by the former as giving too much power to the Crown, and by the latter as giving too much power to the Colonies.

Albany Regency. In American political history the name applied to a group of Democratic leaders in New York State, who held con-

trol of the party machinery there, 1820-54, and exerted a powerful influence throughout the state and nation. The organization was distinguished by the ability of its leaders and by the exploitation of the 'spoils system.' Among them were Martin Van Buren, John A. Dix and Benjamin F. Butler.

Albatross (al'ba-tros), a large marine swimming bird of several species, of which the wandering albatross (*Diomedēa exulans*) is the best known. The bill is straight and strong, the upper mandible hooked at the point and the lower one truncated; there are three webbed toes on each foot. The upper part of the body is of a grayish brown, and the belly white. It is the largest sea-bird known, some measuring 17½ feet from tip to tip of their expanded wings. They abound at the Cape of Good Hope and in other parts of the southern seas. and in Behring Straits, and have been known to accompany ships for whole days without ever resting on the waves. From this habit the bird is regarded with feelings of attachment and superstitious awe by sailors, it being reckoned unlucky to kill one. Coleridge has availed himself of this feeling in his *Ancient Mariner*. The albatross is met with at great distances from the land, settling down on the waves at night to sleep. It is exceedingly voracious whenever food is abundant, gorging to such a degree as to be unable to fly or swim. It feeds on fish, carrion, fish-spawn, oceanic mollusca, and other small marine animals. Its voice is a harsh, disagreeable cry. Its nest is a heap of earth; its eggs are larger than those of a goose.

Albatross

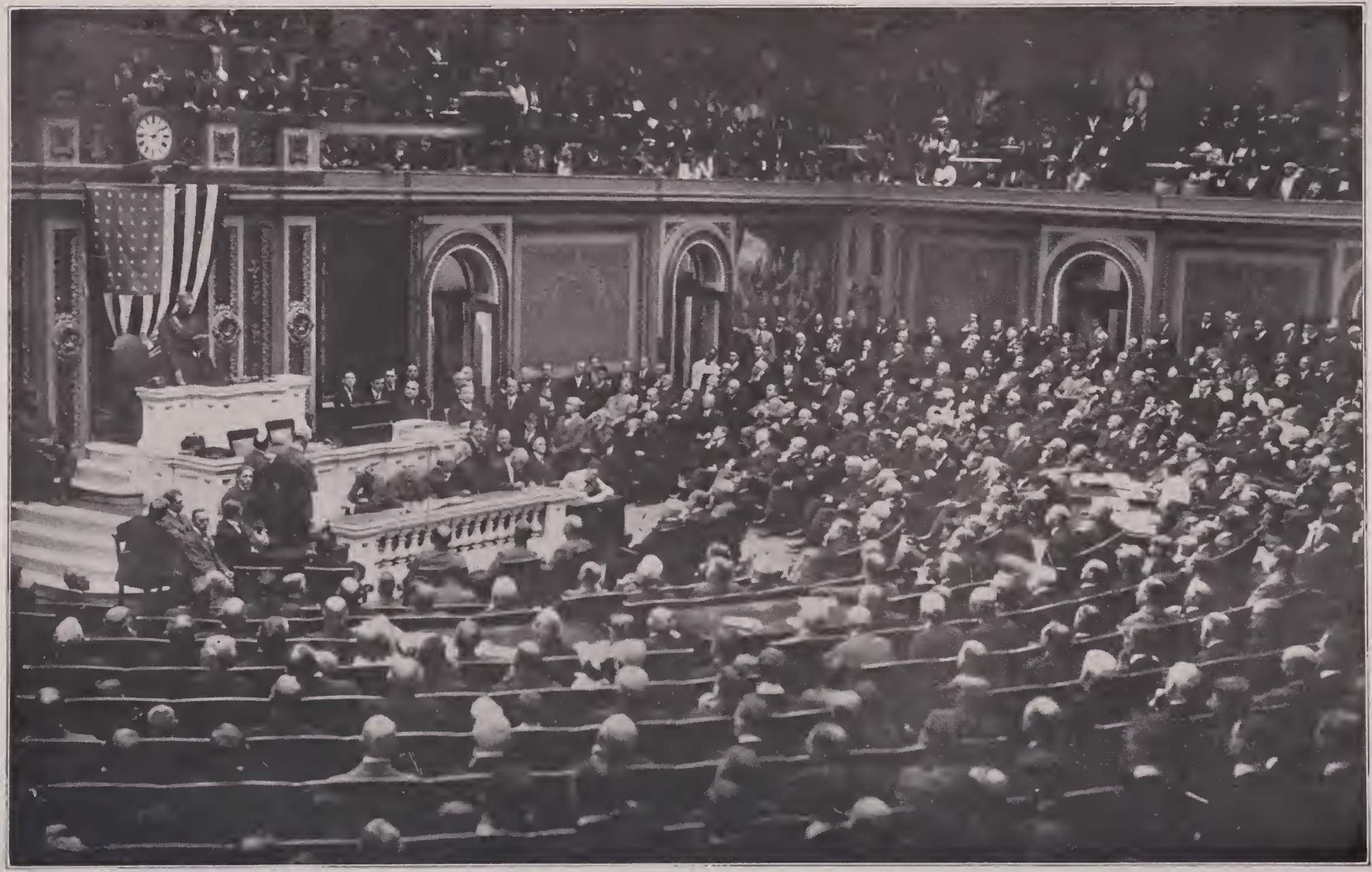
Albay (ål-bī'), a province, town, bay, and volcano in the southeast part of the island of Luzon, one of the Philippines. The province is mountainous but fertile; the town regularly built, with a population of 14,049, the bay capacious, secure, and almost landlocked; and the volcano, which is always in activity, forms a conspicuous landmark. The province Albay is noted as being the richest hemp-growing district on the island. The town Albay is the chief port.

Albemarle, Duke of. See *Monk, George.*

Albemarle, a Confederate iron-clad ram. She did much damage to Union steamers during the spring of 1864, but was destroyed by Lieut. W. B. Cushing during the night of October 27 of that year. She was torpedoed from a small launch commanded by Cushing.

Alberoni, Cardinal Giulio (jū'li-o ål-bā-rō'nē), born in 1664 in north Italy, and educated for the church. The Duke of Parma sent him as his minister to Madrid, where he gained the affection of Philip V. He rose by cunning and intrigue to the station of prime minister, became a cardinal, was all powerful in Spain after the year 1715, and endeavored to restore it to its ancient splendor. In pursuance of this object he invaded Sardinia and Sicily, and indeed entertained the idea of stirring up a general war in Europe. The alliance of France and England, however, rendered his schemes abortive, and led to his dismissal and exile in 1720. He wandered about a long time under false names and using many disguises and was for a time at liberty to continue his plotting. At the earnest request of the Pope and the Spanish monarch, however, he was arrested and imprisoned in the Genoese territory. Shortly afterward he was released, and two years after the death of Pope Clement and the accession of Innocent XIII he was restored to all the rights and honors of a cardinal. He died on June 26, 1752, at Piacenza on the river Po, where he had lived in retirement for twelve years, from 1740. He founded at Piacenza the Collegio Alberoni, a college for the education of poor boys for the priesthood.

Albert (ål'bar'), a town in Picardy, France, the center of terrific fighting during the European war. It was captured by the Germans, but was retaken by the British and Canadian forces in the famous 'spring drive of 1917,' which forced the German line back for 20 miles. It was for over a year the concentration point of the British headquarters. In March, 1918, Albert once more changed hands, the German hordes released from Russia sweeping across the country, bringing devastation after attempted rehabilitation. Hardly a square mile of blood-drenched Flanders was so crowded with tragic surprises as the environs, for a space of twenty miles, of this little town on the Ancre, a stream made famous by the succession of battles fought there. Albert was once known as Ancre, and was the seat of the marquisate of Ancre.



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KING ALBERT OF BELGIUM ADDRESSING THE HOUSE OF REPRESENTATIVES IN WASHINGTON

Albert I, King of the Belgians (1875-), nephew of Leopold II, whom he succeeded in 1909. He visited the United States in 1898; and with Queen Elizabeth and Prince Leopold, Duke of Brabant, heir apparent, made a second visit in 1919, following the European war (q. v.), in which he played a heroic part.

Albert I, Duke of Austria and afterwards Emperor of Germany, son of Rodolph of Hapsburg, was born in 1248. On the death of his father in 1292 he claimed the empire, but his arrogant conduct drove the electors to choose Adolphus of Nassau emperor. Adolphus, after a reign of six years, having lost the regard of all the princes of the empire, Albert was elected to succeed him. A battle ensued near Gellheim, in which Adolphus fell by the hand of his adversary, who was elected and crowned. He was assassinated at Windisch in May, 1308, by his nephew John, Duke of Suabia.

Albert, first Duke of Prussia, and last grand-master of the Teutonic Order, was born in 1490; died in 1568. In 1511 he was chosen by the Teutonic knights grand-master of their order. Being nephew of Sigismund, King of Poland, the knights hoped by his means to be freed from the feudal superiority of Poland, and placed under the protection of the empire. This superiority, however, Sigismund refused to surrender, and war broke out between uncle and nephew. He subsequently became reconciled to his uncle, abandoned the vows of his order, became a Protestant, and obtained his investiture as hereditary duke of Prussia under the Polish crown, the territorial rights of the Teutonic Order being thus set aside. The latter years of his reign were spent in organizing the government and promoting the prosperity of his duchy; he founded schools and churches, established a ducal library, and opened the University of Königsberg in 1543.

Albert, PRINCE, Albert Francis Augustus Charles Emmanuel, Prince of Saxe-Coburg-Gotha, second son of Ernest I, Duke of Saxe-Coburg, was born 26th August, 1819. In 1837 he entered the University of Bonn, and on Feb. 10, 1840, was married to his cousin, Queen Victoria of England. He received the title of Royal Highness by patent, was made a field-marshal, a Knight of the Garter, of the Bath, etc. Other honors were subsequently bestowed upon him, the chief of which was the title of Prince Consort (1857). He carefully abstained from party politics, but never ceased to take a deep and active interest in the welfare of the people in general. He presided and delivered the inaugural address at the meeting of the British Association at Aberdeen in 1859. He died of typhoid fever on December 14, 1861, after a short illness. A biography of the prince by Sir Theodore Martin has been published in five volumes, London, 1875-80.

Alberta (al-ber'ta), until the year 1905 one of the Northwest Territories of Canada, was then made a province of the Dominion and its area much increased, embracing the western half of the former territory of Athabasca and strips of Saskatchewan and Assiniboia. Topographic and climatic conditions divide the territory into a southern and a northern region. South Alberta is a ranching and dairying country; North Alberta is an agricultural district, producing grain, vegetable and root crops. The country is watered by the Smoky, Athabasca, North Saskatchewan, Battle, Red Deer, Bow, Belly and Milk rivers. The coal and asphalt resources are very great. The University of Alberta (founded 1907) is at Edmonton. Area, 255,285 sq. miles; pop. 496,525.

Albert Edward Nyanza, a lake of Africa, 110 miles W. of Victoria Nyanza, and 100 miles S. by W. of Albert Nyanza. It is 40 miles in length and breadth; elevation, 2870 feet. The Semliki River connects it with Albert Nyanza. Discovered by Stanley in 1875. Now called EDWARD NYANZA.

Albert Lea, a city, county seat of Freeborn county, Minnesota, on Albert Lea and Fountain lakes, 108 miles S. of Minneapolis. It is a railroad and distributing center, and has large packing plant and numerous factories, and a state creamery. Pop. 8056.

Albert Nyanza (nī-an'za), a lake of Africa, one of the feeders of the Nile, lying (approximately) between lat. 2° 30′ and 1° 10′ N., and with its northeast extremity in about lon. 28° E.; general direction from northeast to southwest: surface about 2200 feet above sea level.

Albertite (al'ber-tīt), a variety of asphalt occurring in subcarboniferous rocks in Albert Co., N. B., Ohio, Kentucky and West Virginia.

Albertus (äl-ber'tus) MAGNUS, or ALBERT THE GREAT, Count of Bollstädt, a distinguished German scholar of the thirteenth century, born in 1193, studied at Padua, became a monk of the Dominican order, teaching in the schools of Hildesheim, Ratisbon, and Cologne, where Thomas Aquinas became his pupil. In 1245 he went to Paris and publicly expounded the doctrines of Aristotle, notwithstanding the prohibition

of the church. He became rector of the school of Cologne in 1249; in 1254 he was made provincial of his order in Germany; and in 1260 he received from Pope Alexander IV the appointment of Bishop of Ratisbon. Died at Cologne, 1280.

Albi. See *Alby*.

Albia (al'bi-a), a city, county seat of Monroe county, Iowa, 68 miles S. E. of Des Moines, on 3 railroads. It is in a coal district. There is also a large trade in farm products. Pop. (1920) 5067.

Albigenses (al-bi-jen'sēz), a sect which spread widely in the south of France and elsewhere about the twelfth century, and which rejected Scripture, infant baptism, marriage, churches, priesthood, and the mass, and admitted the equality of good and evil. They are said to have been so named from the district of Albi, where, and about Toulouse, Narbonne, etc., they were numerous. A crusade was begun in 1209 against them and against Count Raymond VI of Toulouse for exploiting them. This crusade, political rather than religious, was very cruelly waged to bring Languedoc into submission to the crown of France. Béziers, the capital of Raymond's nephew Roger, was taken by storm, and 20,000 of the inhabitants, without distinction of creed, were put to the sword. Simon de Montfort, the military leader of the crusade, was equally severe towards other places in the territory of Raymond and his allies. After the death of Raymond VI, in 1222, his son, Raymond VII, was obliged, notwithstanding his readiness to do penance, to defend his inheritance against the papal legates and Louis VIII of France. When very many thousands had fallen on both sides, a peace was made in 1229, by which Raymond was obliged to cede Narbonne with other territories to Louis IX, and make his son-in-law, a brother of Louis, his heir. The heretics were now delivered up to the proselytizing Dominicans, and to the inquisition, and they disappeared after the middle of the thirteenth century.

Albina (al-bē'na), formerly a city of Multnomah Co., Oregon, now a part of Portland.

Albinos (al-bī'nōz), the name given to those persons from whose skin, hair, and eyes, in consequence of some defect in physiological activity, the dark coloring matter is absent. The skin of albinos, therefore, whether they belong to the white, Indian, or negro races, is of a uniform pale milky color, their hair is white, while the irides of their eyes are pale-rose color, and the pupil intensely red, the absence of the dark pigment allowing the multitude of blood-vessels in these parts of the eye to be seen. For the same reason their eyes are not well suited to endure the bright light of day, and they see best in shade or by moonlight. The peculiarity of *albinism* or *leucopathy* is always born with the individual, and is not confined to the human race, having been observed also in horses, rabbits, rats, mice, etc., birds (white crows or white blackbirds are not particularly uncommon), and fishes.

Albion (al'bi-on) (Celtic *Albainn*, probably connected with L. *albus*, white), the earliest name by which the island of Great Britain was known.

Albion, a city of Calhoun county, Michigan, on the Kalamazoo River, 96 miles W. of Detroit. It has several metal factories, including one of the largest automobile hub plants in the world. Seat of Albion College (Meth. Epis., founded 1843, reorganized 1849). Pop. (1920) 8354.

Albion, a village, capital of Orleans Co., New York, on the Erie Canal, 30 miles W. of Rochester. It has extensive stone-quarries and canning factories. Here is situated the Western House of Refuge for Women. Pop. 5,016.

Albite (al'bīt) or SODA-FELSPAR, a mineral, a kind of felspar, usually of a white color, to which property it owes its name (L. *albus*, white), but occasionally bluish, grayish, greenish, or reddish white.

Alboin (al'boin), King of the Lombards, succeeded his father Audoin in 561, and reigned in Noricum and Pannonia. Narses, the general of Justinian, sought his alliance, and received his aid, in the war against Totila, king of the Ostrogoths. Alboin afterwards (in 568) undertook the conquest of Italy, where Narses, who had subjected this country to Justinian, offended by an ungrateful court, sought an avenger in Alboin, and offered him his co-operation. After a victorious career in Italy he was slain at Verona, in 573 or 574, by an assassin, instigated by his wife Rosamond, whose hatred he had incurred by sending her, in one of his fits of intoxication, a cup wrought from the skull of her father, and forcing her to drink from it.

Albrecht (ål'bre*h*t), the German form of *Albert* (which see).

Albrechtsberger (ål'bre*h*ts-ber-gėr), JOHANN GEORG, a German composer and writer on music; a teacher of Beethoven, Moscheles, etc. Born 1736, died 1809.

Albret, D' JEANNE (zhän däl-brā), Queen of Navarre, wife of

Antoine de Bourbon and mother of Henri IV of France, a zealous supporter of the reformed religion, which she established in her kingdom; born 1528, died (probably poisoned), 1572, shortly before the massacre of St. Bartholomew.

Albronze, an alloy of aluminum and copper, of very durable character, used for telescope bearings, etc.

Albuera (ål-bu-ā′rà), a village of Spain, in Estremadura, 12 miles S. S. E. of Badajoz. A battle was fought here, May 16, 1811, between the army of Marshal Beresford (30,000) and that of Marshal Soult (25,000), when the latter was obliged to retreat to Seville, leaving Badajoz to fall into the hands of the allies. Pop. 800.

Albugo (al-bū′gō) an affection of the eye, consisting of a white opacity in the cornea; called also *leucoma*.

Album, a name now generally given to a blank book for the reception of pieces of poetry, autographs, engravings, photographs, post cards, etc.

Albumen (al-bū′men), or ALBUMIN (L., from *albus*, white), a substance, or rather group of substances, so named from the Latin for the white of an egg, which is one of its most abundant known forms. It may be taken as the type of the protein compounds or the nitrogenous class of foodstuffs. One variety enters largely into the composition of the animal fluids and solids, is coagulable by heat at and above 160°, and is composed of carbon, hydrogen, nitrogen, and oxygen, with a little sulphur. It abounds in the serum of the blood, the vitreous and crystalline humors of the eye, the fluid of dropsy, the substance called coagulable lymph, in nutritive matters, the juice of flesh, etc. The blood contains about 7 per cent of albumen. Another variety, called vegetable albumen, exists in most vegetable juices and many seeds, and has nearly the same composition and properties as egg albumen. When albumen coagulates in any fluid it readily encloses any substance that may be suspended in the fluid. Hence it is used to clarify syrupy liquors. In cookery white of eggs is employed for clarifying, but in large operations like sugar-refining the serum of blood is used. From its being coagulable by various salts, and especially by corrosive sublimate, with which it forms an insoluble compound, white of egg is a convenient antidote in cases of poisoning by that substance. With lime it forms a cement to mend broken ware.

In botany the name albumen is given to the farinaceous matter which surrounds the embryo, the term in this case having no reference to chemical composition. It constitutes the meat of the cocoanut, the flour or meal of cereals, the roasted part of coffee, etc.

Albumenuria (al-bū-me-nū′ri-a), or ALBUMINURIA, a condition in which the urine contains albumen, evidencing a diseased state of the kidneys.

Albunol (ål-bu-nyol′), a seaport of southern Spain, prov. Granada, on the Mediterranean. Pop. 8500.

Albuquerque (ål-bu-kerk′ā), AFFONSO DE, an eminent Portuguese admiral, born 1452, died in 1515. Portugal having subjected to its power a large part of the western coast of Africa, and begun to extend its sway in the East Indies, Albuquerque was appointed viceroy of the Portuguese acquisitions in this quarter, and arrived in 1503 with a fleet on the coast of Malabar. His career here was extremely successful, he having extended the Portuguese power over Malabar, Ceylon, the Sunda Islands, and the Peninsula of Malacca, and made the Portuguese name respected.

Albuquerque, the county seat of Bernalillo county, New Mexico, on the Rio Grand, 56 miles southwest of Santa Fé, on the Atchison, Topeka and Santa Fé and Santa Fé Pacific railroads, is the largest distributing center of the state. Pop. 15,157.

Alburnum (al-bur′num), the soft white substance which, in trees, is found between the inner bark and the wood, and in progress of time acquiring solidity, becomes itself the wood. A new layer of wood, or rather of alburnum, is added annually to the tree in every part just under the bark. Alburnum, or *sapwood* as it is called by timber merchants, consists of little but vegetable tissue, and is much less durable than *heartwood*, or *duramen*, vegetable tissue combined with solid secretions.

Albury (al′ber-i), a town of New South Wales, Australia, on the right bank of the Murray river, which separates it from Victoria. It is 190 miles northeast of Melbourne, 386 miles from Sydney, in a good agricultural and wine-producing district. Pop. in 1911, 6300.

Alby, or ALBI (ål′bē) an old town of southern France, department of Tarn, 42 miles northeast of Toulouse, on the Tarn, in an extensive plain. It has a cathedral, a Gothic structure, begun in 1882; and manufactures of linens, cottons, leather, etc. Alby is said to have given the Albigenses their name. Pop. 14,951.

Alcæus (al-sē'us), one of the greatest Grecian lyric poets, was born at Mitylene, in Lesbos, and flourished there at the close of the seventh and beginning of the sixth centuries B.C.; but of his life little is known. A strong, manly enthusiasm for freedom and justice pervades his lyrics, of which only a few fragments are left. He wrote in the Æolic dialect, and was the inventor of a metre that bears his name, which Horace has employed in many of his odes.

Alcalá de Guadaira (al-ka-la' de gwá-dī'rá; 'the Castle of Guadaira'), a town of Southern Spain, on the Guadaira, 7 miles east of Seville, chiefly celebrated for its manufacture of bread, with which it supplies a large part of the population of Seville. Pop. about 8,000.

Alcalá de Henares (en-ä'res), a beautiful city of Spain, 16 miles E. N. E. of Madrid, 1 mile from the Henares. It has an imposing appearance when seen from some distance, but on nearer inspection is found to be in a state of decay. There was formerly a university here, at one time attended by 10,000 students, but in 1836 it was removed with its library to Madrid. Cervantes was born here. Pop. 11,206.

Alcalá la Real (rā-äl'), a town of Spain, 18 miles S. W. of Jaen, with a fine abbey and some trade. It was captured in 1340 by Alphonso XI of Leon, from whence it derives the epithet Real ('Royal'). Pop. 15.973.

Alcalde (Spanish; ål-kål'dā), or ALCAIDE (Portuguese; ål-kī'dā; Arabic *alqadi*, the judge), the name of a magistrate in the Spanish and Portuguese towns, to whom the administration of justice and the regulation of the police is committed. His office nearly corresponds to that of justice of the peace. The name and the office are of Moorish origin.

Alcamo (äl'kä-mo), a city in the west of Sicily, 2½ miles south of the Gulf of Castellamare, near the site of the ancient Segesta, the ruins of which, including a well-preserved Doric temple and a theater as well as the remains of Moorish occupation, are still to be found here. The district is celebrated for its wine. Pop. 51,809.

Alcañiz (ål-kän-yēth'), a town of Northeastern Spain (Aragon). Pop. 7,806.

Alcantara (äl-kän'tä-rä) (Arabic, the bridge) an ancient town and frontier fortress of Spain, on the Tagus, on a rocky acclivity, and inclosed by ancient walls. Pop. about 3000. *Order of Alcantara*, an ancient Spanish order of knighthood instituted for defense against the Moors in 1156, and made a military religious order in 1177.

Alcarraza (ål-kär-rä'thá), a vessel made of a kind of porous, unglazed pottery, used in Spain to hold drinking water, which, oozing slightly through the vessel, is kept cool by the evaporation that takes place at the surface. Similar vessels have been long used in Egypt and elsewhere.

Alcázar de San Juan (ål-kä'thar dā sän-*h*wän), a town of Spain, province of Ciudad-Real (New Castile), with manufactures of soap, saltpetre, gunpowder, chocolate, etc. Pop. 11,499.

Alce'do. See *Kingfisher*.

Alcestis (al-sēs'tis), in Greek mythology, wife of Admetus, King of Thessaly. Her husband was ill, and, according to an oracle, would die unless some one made a vow to meet death in his stead. This was secretly done by Alcestis, and Admetus recovered. After her decease Hercules brought her back from the infernal regions.

Alchemy, or ALCHYMY (al'ke-mi), the art which in former times occupied the place of and paved the way for the modern science of chemistry (as astrology did for astronomy), but whose aims were not scientific, being confined solely to the discovery of the means of indefinitely prolonging human life, and of transmuting the baser metals into gold and silver. Among the alchemists it was generally thought necessary to find a substance which, containing the original principle of all matter, should possess the power of dissolving all substances into their elements. This general solvent, or *menstruum universale*, which at the same time was to possess the power of removing all the seeds of disease out of the human body and renewing life, was called the *philosopher's stone*, *lapis philosophorum*, and its pretended possessors were known as *adepts*. Alchemy flourished chiefly in the middle ages, though how old might be such notions as those by which the alchemists were inspired it is difficult to say. The mythical Hermes Trismegistus of pre-Christian times was said to have left behind him many books of magical and alchemical learning, and after him alchemy received the name of the *hermetic art*. At a later period chemistry and alchemy were cultivated among the Arabians, and by them the pursuit was introduced into Europe, the studies of the alchemists lead-

ing to valuable chemical discoveries. Many of the monks devoted themselves to alchemy, although they were latterly prohibited from studying it by the popes. But there was one even among these, John XXII, who was fond of alchemy. Raymond Lully, or Lullius, a famous alchemist of the thirteenth and fourteenth centuries, is said to have changed for King Edward I a mass of 50,000 lbs. of quicksilver into gold, of which the first rose-nobles were coined. Among other alchemists may be mentioned Paracelsus and Basilius Valentinus. When more rational principles of chemistry and philosophy began to be diffused and to shed light on chemical phenomena the rage for alchemy gradually decreased. It is still impossible to assert anything with certainty about the transmutation of metals.

Alcibiades (al-se-bī'a-dēs), an Athenian of high family and of great abilities, but lacking moral principle, was born at Athens in B.C. 450, being the son of Cleinias, and a relative of Pericles, who also was his guardian. In youth he was remarkable for the beauty of his person, no less than for the dissoluteness of his manners. He came under the influence of Socrates, but little permanent effect was produced on his character by the precepts of the sage. He acquired great popularity by his liberality in providing for the amusements of the people, and after the death of Cleon attained a political ascendency which left him no rival but Nicias. Thus he was enabled to play an important part in the long-continued Peloponnesian war. In 415 he advocated an expedition against Sicily, and was chosen one of the leaders, but before the expedition sailed he was charged with profaning and divulging the Eleusinian mysteries, and mutilating the busts of Hermes, which were set up in public all through Athens. Rather than stand his trial he went over to Sparta, divulged the plans of the Athenians, and assisted the Spartans to defeat them. Sentence of death and confiscation was pronounced against him at Athens, and he was cursed by the ministers of religion. He soon left Sparta and took refuge with the Persian satrap Tissaphernes, ingratiating himself by his affectation of Persian manners, as he had previously done at Sparta by a similar affectation of Spartan simplicity. He now began to intrigue for his return to Athens, offering to bring Tissaphernes over to the Athenian alliance, and latterly he was recalled and his banishment cancelled. He, however, remained abroad for some years in command of the Athenian forces, gained several victories, and took Chalcedon and Byzantium. In B.C. 407 he returned to Athens, but in 406 the fleet which he commanded having suffered a severe defeat, he was deprived of his command. He once more went over to the Persians, taking refuge with the satrap Pharnabazus of Phrygia, and here he was assassinated in B.C. 404.

Alcinous (al-sin'o-us), King of the Phæacians. See *Ulysses*.

Alcira (ål-thē'rå), a well-built and strongly fortified town of Spain, province of Valencia, founded by the Carthaginians. Pop. of commune 20,572.

Alcman (alk'man), the chief lyric poet of Sparta, a Lydian by birth, flourished between B.C. 671 and 631, and wrote (in the Doric dialect) love songs, hymns, pæans, etc., of which only fragments remain.

Alcmena. See *Amphitryon*.

Alco (al'kō), the native American generic name of *Canis familiaris*, var. *Americanus*, a dog inhabiting Peru and Mexico, having a small head, large, pendulous ears, an arched back, a short and pendant tail. The fur is long, yellowish on the back and the tail is whitish. It is akin to the shepherd dog and has been domesticated.

Alcobaça (al-kō-bä'så), a small town of Portugal, 50 miles N. of Lisbon, celebrated for a magnificent Cistercian monastery founded in 1148 by Don Alphonso I, and containing several royal tombs. Pop. 2309.

Alcohol (al'kō-hol), the hydroxides of hydrocarbon radicals, is the spirituous or intoxicating part of starch or sugar containing liquids that have undergone fermentation, it being extracted by distillation—a limpid, colorless liquid, of an agreeable smell and a strong, pungent taste. When brandy, whisky, and other spirituous liquors, themselves distilled from cruder materials, are again distilled, highly volatile alcohol is the first product to pass off. The alcohol thus obtained contains much extraneous matter, including a proportion of water, from the first as high as 20 or 25 per cent. and increasing greatly as the process continues. Charcoal and carbonate of soda put in the brandy or other liquor partly retain the fusel-oil and acetic acid it contains. The product thus obtained by distillation is called *rectified spirits* or *spirits of wine*, and contains from 55 to 85 per cent. of alcohol, the rest being water. By distilling rectified spirits over carbonate of potassium, powdered quicklime, or chloride of calcium, the greater part of the water is

retained, and nearly pure alcohol passes over. It is only, however, by very prolonged digestion with desiccating agents and subsequent distillation that the last traces of water can be removed. The specific gravity of alcohol varies with its purity, decreasing as the quantity of water it contains decreases. This property is a convenient test of the alcoholic strength of liquors that contain only alcohol and water; but on account of the condensation that invariably takes place on the mixture of these two liquids, it can be applied only in connection with special tables of reference, or by means of an instrument specially adapted for the purpose. (See *Alcoholometer.*) Alcohol is composed of carbon, hydrogen, and oxygen, in the proportions expressed by the formula C_2H_5OH. This is ethyl or grain alcohol, the only variety fit for internal use. Under a barometric pressure of 29.5 inches it boils at 173° F. (78.4° C.); in the exhausted receiver of an air-pump it boils at ordinary temperatures. Its congelation has been effected only in recent times at the low temperature of —203° F. Its very low freezing-point renders it valuable for use in thermometers for very low temperatures. Alcohol is extremely inflammable, and burns with a pale-blue flame, scarcely visible in bright daylight. It occasions no carbonaceous deposit upon substances held over it, and the products of its combustion are carbon dioxide and water. The steady and uniform heat which it gives during combustion makes it a valuable material for fuel. It dissolves the vegetable acids, the volatile oils, the resins. tan, and extractive matter, and many of the soaps; the greater number of the fixed oils are taken up by it in small quantities only, but some are dissolved largely. When alcohol is submitted to distillation with certain acids a peculiar compound is formed, called *ether* (which see). It is alcohol which gives all intoxicating liquors the property whence they are so called. Alcohol acts strongly on the nervous system, and though in small doses it is stimulating and exhilarating, in large doses it acts as a poison. In medicine it is often of great service.

The name alcohol is also applied in chemistry to a large group of compounds of carbon, hydrogen, and oxygen whose chemical properties are analogous to that of common or ethylic alcohol. Methyl or wood alcohol (CH_3OH) is extremely poisonous when ingested, producing blindness and death. Under a recent law denatured alcohol, that is, alcohol which has been made unfit for use as a beverage by the addition of nauseous ingredients, may be used as fuel or for other industrial purposes without payment of the internal tax laid on untreated alcohol.

Alcoholism (al'kō-hol-izm), a morbid condition of the body (especially of the nervous system) brought on by the immoderate use of alcoholic liquors.

Alcoholometer (om'e-ter), an instrument constructed on the principle of the hydrometer to determine from the specific gravity of spirituous liquors the percentage of alcohol they contain, the scale marking directly the required proportion. If the liquor contain anything besides water and alcohol, previous distillation is necessary.

Alcott (al'kot), Amos Bronson, American educator and writer, father of Louisa May Alcott; born 1799; died 1888. In 1834 he opened a school at Boston, which by its revolutionary methods attracted the unfavorable notice of the public. It did not prove pecuniarily successful, and in 1839 he gave it up, though he had won the affection of his pupils and his educational methods had wakened the interest of students of pedagogy. On his return from a visit to England he started a communistic farm experiment, 'Fruitlands,' near Harvard, Mass., but shortly abandoned the project. The most important of his works are *Tablets* and *Concord Days.*

Alcott, Louisa May, an American authoress, born Nov. 29, 1832, at Germantown, a suburb of Philadelphia, Pa. She wrote a number of books chiefly intended for the young: *Little Women, An Old-Fashioned Girl, Little Men, Jack and Gill,* etc. Died March 6, 1888.

Alcuin (alk'win; in his native tongue *Ealhwine*), a learned Englishman, the confidant, instructor, and adviser of Charles the Great (Charlemagne). He was born at York in 735, and was educated and later had the management of the school at York. Alcuin having gone to Rome, Charlemagne became acquainted with him at Parma, invited him in 782 to his court, and made use of his services in his endeavors to civilize his subjects. To secure the benefit of his instructions Charlemagne established at his court a school, called *Schola Palatina,* or the Palace School. In the royal academy Alcuin was called *Flaccus Albinus.* Most of the schools of that period in France were either founded or improved by him; thus he founded the school in the abbey of St. Martin of Tours, in 796, after the plan of the school in York. Alcuin left the court in 801, and retired to the abbey of St. Martin of Tours, but kept up a constant correspondence with Charles to his

death in 804. He left works on theology, philosophy, rhetoric, also poems and letters, all of which have been published.

Alcyonaria (al-si-ō-nā′ri-a), cœlenterate animals forming a great division of the class Actinozoa (see *Sea-anemone*). These animals are nearly all composite, and the individual polyps have mostly eight tentacles. They

Alcyonaria.

1. Sea-fan (*Gorgonia flabellum*). 2. Sea-pen (*Pennatula phosphorea*). 3. *Cornularia rugosa.*

include the organ-pipe corals, sea-pens, fan-corals, etc., as also the red coral of commerce. The polyps essentially resemble those of the genus Alcyonium in structure, and in the number and arrangement of the tentacles. See *Alcyonium.*

Alcyonium (al-si-ō′ni-um), a genus of cœlenterate animals, one familiar species of which, dredged around the British coasts—*A. digitātum*—is named 'Dead-Men's Fingers,' or 'Cows' Paps,' from its lobed or digitate appearance. It grows attached to stones, shells, and other objects. It consists of a mass of little polyps, each polyp possessing eight little fringed tentacles disposed around a central mouth. The Alcyonium forms the type of the *Alcyonaria.*

Aldan (al′dan), a river of Eastern Siberia, a tributary of the Lena, 1200 miles in length. The Aldan Mountains run along parallel to it on the left for 400 miles.

Aldebaran (al-deb′a-ran), a star of the first magnitude, forming the eye of the constellation Taurus or the Bull, the brightest of the five stars known to the Greeks as the Hyades. Spectrum analysis has shown it to contain antimony, bismuth, iron, mercury, hydrogen, sodium, calcium, etc.

Aldehyde (al′de-hīd), the oxidation product of an alcohol intermediate between it and its acid. Common aldehyde (CH_3COH) is derived from spirit of wine by oxidation, and is a colorless, limpid, volatile, and inflammable liquid, with a peculiar ethereal odor, which is suffocating when strong; specific gravity, 0.79. It oxidizes in air, and is converted into acetic acid. It rapidly decomposes oxide of silver, depositing a brilliant film of metallic silver; hence it is used in silvering curved glass surfaces.

Alder (ạl′dėr; *Alnus*), a genus of plants, nat. order Betulaceæ (Birch), consisting of trees and shrubs inhabiting the temperate and colder regions of the globe. Common alder (*Alnus glutinōsa*) is a tree which grows in wet situations in Europe, Asia, and the United States. Its wood, light and soft and of a reddish color, is used for a variety of purposes, and is well adapted for work which is to be kept constantly in water. The roots and knots furnish a beautifully-veined wood well suited for cabinet work. The bark is used in tanning and leather dressing, and by fishermen for staining their nets. This and the young twigs are sometimes employed in dyeing, and yield different shades of yellow and red. With the addition of copperas it yields a black dye.

Alderman (ạl′dėr-man; Anglo-Saxon *ealdorman*, from *ealdor*, older, and *man*), among the Anglo-Saxons a person of a rank equivalent to that of an earl or count, the governor of a shire or county, and member of the *witenagemót* or great council of the nation. Aldermen, at present, in the United States and England, are officers associated with the mayor of a city for the administration of the municipal government, constituting a local legislating body.

Alderney (ạl′der-nē, French *Aurigny*), an island belonging to Britain off the coast of Normandy, the most northerly of the Channel Islands, between 3 and 4 miles long, and about 1¼ broad. The coast is bold and rocky, the interior fertile. About a third of the island is occupied by grass lands; and the Alderney cows, a small-sized but handsome breed, are famous for the richness of their milk. The climate is mild and healthy. A judge, with six 'jurats,' chosen by the people for life, and twelve 'douzaniers,' representatives of the people, form a kind of local legislature. The French language still prevails among the inhabitants, but all understand and many speak English. The *Race of Alderney* is the strait between the coast of France and this island. Pop. about 2,000.

Aldershot (ạl′dėr-shot), a town and military station in England, the latter having given rise to the

former. The station is used for exercise in camp life and the arts of war. Pop. (including military), 35,175.

Aldhelm, St. (äld'helm), English scholar and prelate, Bishop of Sherborne, born 640; died 709. He was a great fosterer of learning. His writings are preserved in *Patres Ecclesiæ Anglicæ*.

Aldine Editions, the name given to the works which proceeded from the press of Aldus Manutius and his family at Venice (1490-1597). (See *Manutius.*) Recommended by their value, as well as by a splendid exterior, they have gained the respect of scholars and the attention of book-collectors. Many of them are the first printed editions (*editiones principes*) of Greek and Latin classics. Others are texts of the modern Italian authors. These editions are of importance in the history of printing. Aldus had nine kinds of Greek type, and no one before him printed so much and so beautifully in this language. Of the Latin character, he had fourteen kinds of type and was the inventor of italic type.

Aldobrandini (äl-do-bran-dē'nē), the name of a Florentine family which rose to princely rank, produced one pope (Clement VIII) and several cardinals, archbishops, bishops, and men of learning. It is now extinct. —Aldobrandini Marriage, an ancient fresco painting belonging probably to the time of Augustus, discovered in 1606, and acquired by Cardinal Aldobrandini, nephew of Clement VIII, now in the Vatican. It represents a marriage scene in which ten persons are portrayed, and is considered one of the most precious relics of ancient art.

Aldred (al'dred), or Ealdred, Anglo-Saxon prelate, Bishop of Worcester and Archbishop of York, born 1000 (?), died 1069. He improved the discipline of the church and built several ecclesiastical edifices. On the death of Edward the Confessor he is said to have crowned Harold. Having submitted to the Conqueror, whose esteem he enjoyed and whose power he made subservient to the views of the church, he also crowned him as well as Matilda.

Aldrich (ald'ritch), Henry, Dean of Christchurch, Oxford; born in 1647, died in 1710; distinguished as a writer on logic, as an architect, and as a musician. His *Compendium of Logic* was a text-book till quite recently. He adapted many of the works of the older musicians, such as Palestrina and Carissimi, to the liturgy of the Church of England, and composed many services and anthems.

Aldrich (ald'rij), Nelson Wilmarth, a prominent American legislator, born at Foster, R. I., Nov. 6, 1841. Elected to the State Assembly in 1875, he became its speaker in the following year; representative in Congress in 1879; and was United States Senator from Rhode Island, 1881–1911. He attained great influence in the Senate, was a forceful advocate of high protective tariff and led the fight in the Senate for the Payne-Aldrich tariff bill of 1909. He died April 16, 1915.

Ald'rich, Thomas Bailey, an American poet and writer of prose tales, mostly humorous, born in 1836, was a short time in a mercantile house, but soon adopted literature as a profession and was for a time editor of the *Atlantic Monthly*. He published in verse: *Ballad of Baby Bell; Pampinea and other Poems; Cloth of Gold and other Poems*, etc.; in prose, *Story of a Bad Boy; Marjorie Daw*, etc. He died in 1907.

Aldridge (ald'rij), Ira, the 'African Roscius,' born near Baltimore, Md., in 1810, died in 1867. He made a successful début in the Royal Theater, London, in *Othello*. On the continent he took high rank in Shakespeare's tragedies; had presents of crosses and medals from emperors and kings; a member of many of the great academies.

Aldrovandi (al-dro-vän'dē) Ulysses, a distinguished Italian naturalist, born 1522, died 1605. He was professor at Bologna, and established botanical gardens and museums of natural history there; wrote a work on natural history in thirteen volumes.

Ale, and Beer, well known and much used fermented liquors. See *Brewing.*

Aleardi (á-lā-ár'dē), Aleardo, a distinguished Italian lyrical and political poet and patriot, born 1812, died 1878. He was a member of the Italian parliament and professor of æsthetics at Brescia.

Ale-conner, formerly an officer in England appointed to assay ale and beer, and to take care that they were good and wholesome.

Ale-cost. See *Costmary.*

Alec'to, in Greek mythology, one of the Furies. See *Furies.*

Aleman (á-le-mán'), Mateo, a Spanish novelist, born about the middle of the sixteenth century, died in 1610. His fame rests on his *Life and Adventures of the Rogue Guzman de Alfarache*, one of the best of the *picaresque* or rogue novels, which give such a lively picture of

the shady classes of society in Spain during the sixteenth and seventeenth centuries. The hero becomes in succession stable-boy, beggar, porter, thief, man of fashion, soldier, valet, merchant, student, robber, galley-slave, and finally his own biographer.

Alemanni, or ALAMANNI (ä-la-män'-nē), a confederacy of several German tribes which, at the commencement of the third century after Christ, lived near the Roman territory, and came then and subsequently into conflict with the imperial troops. Caracalla first fought with them in 213, but did not conquer them; Severus was likewise unsuccessful. About 250 they began to cross the Rhine westwards, and in 255 they overran Gaul along with the Franks. In 259 a body of them was defeated in Italy at Milan, and in the following year they were driven out of Gaul by Postumus. But the Alemanni did not desist from their incursions, notwithstanding the numerous defeats they suffered at the hands of the Roman troops. In the fourth century they crossed the Rhine and ravaged Gaul, but were severely defeated by the Emperor Julian and driven back. Subsequently they occupied a considerable territory on both sides of the Rhine; but Clovis broke their power in 496 and deprived them of a large portion of their possessions. Part of their territory was latterly formed into a duchy called Alemannia or Swabia, this name being derived from Suevi or Swabians, the name which they gave themselves. It is from the Alemanni that the French have derived their names for Germans and Germany in general, namely, *Allemands* and *Allemagne*, though strictly speaking only the modern Swabians and northern Swiss are the proper descendants of that ancient race.

Alembert, D', (ä-läṇ-bār), JEAN LE ROND, a French mathematician and philosopher, born in Paris in 1717, and died there in 1783. He was the illegitimate son of Madame de Tençin, and was exposed at the Church of St. Jean le Rond (hence his name) soon after birth. He was brought up by the wife of a poor glazier, and with her he lived for more than forty years. His parents never publicly acknowledged him, but his father settled upon him an income of 1200 livres. He showed much quickness in learning, entered the Collège Mazarin at the age of twelve, and studied mathematics with enthusiasm and success. Having left college he studied law and became an advocate, but did not cease to occupy himself with mathematics. A pamphlet on the motion of solid bodies in a fluid, and another on the integral calculus, which he laid before the Academy of Sciences in 1739 and 1740, showed him in so favorable a light that the Academy received him in 1741 into the number of its members. He soon after published his famous work on dynamics, *Traité de Dynamique* (1743); and that on fluids, *Traité des Fluides*. He also took a part in the investigations which completed the discoveries of Newton respecting the motion of the heavenly bodies, and published at intervals various important astronomical dissertations, as well as on other subjects. He also took part, with Diderot and others, in the celebrated *Encyclopédie*, for which he wrote the *Discours Preliminaire*, as well as many philosophical and almost all the mathematical articles. He received an invitation from the Russian empress Catherine II to go to St. Petersburg, and Frederick the Great invited him to Berlin, but in vain. From Frederick, however, he accepted a pension. There was an intimate friendship between him and Voltaire.

Alembic (a-lem'bik), a simple apparatus formerly used by chemists for distillation. The *cucurbit*, or body, contains the substance to be distilled, and is usually somewhat like a bottle, bulging below and narrowing towards the top; the *head*, of a globular form, with a flat under-ring, fits on to the neck of the cucurbit, condenses the vapor from the heated liquid, and receives the distilled liquid on the ring inclosing the neck of the lower vessel, and thus causes it to find egress by a discharging pipe into the third section, called the *receiver*.

Alemtejo (å-läṇ-tā'zhō; beyond the Tagus), the largest province of Portugal, and the most southern except Algarve; area 9,430 square miles; pop. 416,105. The capital is Evora.

Alençon (å-läṇ-sōṇ), a town of France, capital of department Orne, and formerly of the Duchy of Alençon, on the right bank of the Sarthe, 105 miles west by south of Paris; well built; has a fine Gothic church (fifteenth century), and interesting remains of the old castle of the Dukes d'Alençon. Alençon was long famed for its point-lace, called 'point d'Alençon,' a branch of industry now much fallen off; it has cotton and flax spinning and weaving, etc.; fine rock-crystal, yielding the so-called 'diamants d'Alençon,' is found in the neighboring granite quarries. Pop. 14,378.—ALENÇON, originally a county, later a dukedom, became united with the crown in 1221, and was given by Louis XI as an appanage

to his fifth son, with whom the branch of the Alençon-Valois commenced. The first duke of the name lost his life at the battle of Agincourt in 1415; another, called Charles IV, married the celebrated Margaret of Valois, sister of Francis I. He commanded the left wing of the French army at the battle of Pavia, where, instead of supporting the king at a critical moment, he fled at the head of his troops, the consequence of which was the loss of the battle and the capture of the king.

Alentejo. See *Alemtejo.*

Aleppo (a-lep′po), a city of Asiatic Turkey, in North Syria, on the river Koik, in a fine plain 60 miles south-east of Alexandretta, which is its port, and 195 miles N. N. E. of Damascus. It has a circumference of about 7 miles, and

Aleppo.

consists of the old town and numerous suburbs. Its appearance at a distance is striking, and the houses are well built of stone. On a hill stands the citadel, and at its foot the governor's palace. Previous to 1822 Aleppo contained about 100 mosques, but in that year an earthquake laid the greater part of them in ruins, and destroyed nearly the whole city. The aqueduct built by the Romans is the oldest monument of the town. Among the chief attractions of Aleppo are its gardens, in which the pistachio-nut is extensively cultivated. Formerly the city was the center of a great import and export trade, and its manufactures, consisting of shawls, cottons, silks, gold and silver lace, etc., were very valuable, but the earthquake already mentioned and various other causes have combined greatly to lessen its prosperity. It has still a trade, however, in wool, cotton, silk, wax, skins, soap, tobacco, etc., and imports a certain quantity of European manufactures.—Aleppo was a place of considerable importance in very remote times. By the Greeks and Romans it was called *Berœa.* It was conquered by the Arabs in 638, and its original name, *Chalybon*, was then turned into *Haleb*, whence the Italian form *Aleppo.* Its population, 200,000 at the beginning of the last century, is now estimated at 127,000, of whom perhaps 25,000 are Christians. The language generally spoken is Arabic.

Aleshki (a-lesh′kē) a town of Southern Russia, gov. Taurida, on the Dnieper. Pop. 9,119.

Alesia (a-lē′zia), a town and fortress of ancient Gaul, at which in B. C. 52 Julius Cæsar inflicted a crushing defeat on the Gauls under Vercingetorix. It is now represented by the village of Alise, department Côte d'Or, near which Napoleon III erected a colossal statue of Vercingetorix in 1865.

Alessandria (äl-es-sän′dre-ä), a town and fortress in North Italy, capital of the province of the same name, in a marshy country, near the junction of the Bormida and the Tanaro. It was built in 1168 by the Cremonese and Milanese, and was named in honor of Pope Alexander III, who made it a bishop's see. It has a cathedral, important manufactures of linen, woolen, and silk goods, and an active trade. It ranks as one of the first fortresses of Europe, the fortifications including a surrounding wall and bastions, and a strong citadel on the opposite side of the Tanare, connected by a bridge with the town.

Two miles distant is the battlefield of Marengo. Pop., exclusive of suburbs, 71,298.

Alessi (a-les'se), GALEAZZO, a distinguished Italian architect, born at Perugia, 1512; died there in 1572. Many palaces, villas, and churches were erected after his designs.

Aletsch (ä'letch) glacier, the greatest glacier in Switzerland, canton Valais, a prolongation of the immense mass of glaciers connected with the Jungfrau, the Aletschhorn (14,000 ft.), and other peaks; about 13 miles long.

Aleurometer (a-lū-rom'e-ter), an instrument for indicating the bread-making qualities of wheaten flour. The indications depend upon the expansion of the gluten contained in a given quantity of flour when freed of its starch by pulverization and repeated washings with water.

Aleutian (a-lū'shan) ISLANDS, a chain of about 150 small islands belonging to the United States, and included in Alaskan boundaries; they separate Bering Sea from the northern part of the Pacific Ocean, and extend nearly 1000 miles from east to west between lon. 163° and 178° W.; total area 6391 square miles; pop. 2000. They are of volcanic formation, and in a number of them there are volcanoes still in activity. Their general appearance is dismal and barren, yet grassy valleys capable of supporting cattle throughout the year are met with, and potatoes, turnips, and other vegetables are successfully cultivated. They afford also an abundance of valuable fur and of fish. The natives, known as Aleuts, belong ethnographically to the same stock as those found in Kamchatka.

Ale'wife (corruption of the Indian name), the *Alosa tyrannus*, a fish of the same genus as the shad, growing to the length of 12 inches, and taken in great quantities in the tidal waters of the rivers of New England, New Brunswick, and Nova Scotia, being salted and exported. It occurs also farther south, is called spring herring in some places, and as an article of food is considered in the United States much superior to the herring.

Alexander (al-eks-an'der), surnamed *the Great*, was the son of Philip of Macedon and his queen Olympias, and was born at Pella, B.C. 356. In youth he had Aristotle as instructor, and he early displayed uncommon abilities. The victory of Chæronea in 338, which brought Greece entirely under Macedonia, was mainly decided by his efforts. Philip having been assassinated, B.C. 336, Alexander, not yet twenty years of age, ascended the throne. His father had been preparing an expedition against the Persians and Alexander determined to carry it out; but before doing so he had to chastise the barbarian tribes on the frontiers of Macedon as well as quell a rising in Greece, in which he took and destroyed Thebes, put 6,000 of the inhabitants to the sword, and carried 30,000 into captivity. Leaving Antipater to govern in his stead in Europe, and being confirmed as commander-in-chief of the Greek forces in the general assembly of the Greeks, he crossed over the Hellespont into Asia, in the spring of 334, with 30,000 foot and 5,000 horse. His first encounter with the Persian forces (assisted by Greek mercenaries) was at the small river Granicus, where he gained a complete victory. Most of the cities of Asia Minor now opened their gates to the victor, and Alexander restored democracy in all the Greek cities. In passing through Gordium he cut the Gordian knot, on which it was believed the fate of Asia depended, and then conquered Lycia, Ionia, Caria, Pamphylia, and Cappadocia. A sickness, caused by bathing in the Cydnus (B. C. 333), checked his course; but scarcely was he restored to health when he continued his onward course, and this same year defeated the Persian emperor Darius and his army of 500,000 or 600,000 men (including 50,000 Greek mercenaries) near Issus (inner angle of the Gulf of Alexandretta). Darius fled towards the interior of his dominions, leaving his family and treasures to fall into the hands of the conqueror. Alexander did not pursue Darius, but proceeded southwards, and secured all the towns along the Mediterranean Sea, though he did not get possession of Tyre (taken 332 B.C.) without a siege of seven months. Palestine and Egypt now fell before him, and in the latter he founded Alexandria, which became one of the first cities of ancient times. Thence he went through the desert of Libya to consult the oracle of Zeus Ammon, and it was said that the god recognized him as his son. On his return Alexander marched against Darius, who had collected an immense army in Assyria, and rejected the proposals of his rival for peace. A battle was fought at Gaugamela, about 50 miles from Arbela,

Coin of Alexander the Great.

B. C. 331, and notwithstanding the immense numerical superiority of his enemy, Alexander (who had but 40,000 men and 7,000 horse) gained a complete victory. Babylon and Susa opened their gates to the conqueror, who marched towards Persepolis, the capital of Persia, and entered it in triumph. He now seems for a time to have lost his self-control. He gave himself up to arrogance and dissipation, and is said in a fit of intoxication to have set fire to the palace of Persepolis, one of the wonders of the world. Rousing himself up, however, he set out in pursuit of Darius, who, having lost his throne, was kept prisoner by Bessus, satrap of Bactriana. Bessus, when he saw himself closely pursued, caused Darius to be assassinated (B.C. 330). Continuing his progress he subdued Bessus and advanced to the Jaxartes, the extreme eastern limit of the Persian empire, but did not fully subdue the whole of this region till 328, some fortresses holding out with great tenacity. In one of these he took prisoner the beautiful Roxana, daughter of Oxyartes, a nobleman of Sogdiana, and having fallen in love with her he married her. Meantime disaffection had once or twice manifested itself among his Macedonian followers and had been cruelly punished; and he had also, to his lasting remorse, killed his faithful friend Cleitus in a fit of drunken rage. Alexander now formed the idea of conquering India, then scarcely known even by name. He passed the Indus (B.C. 326), marched towards the Hydaspes (Jhelum), at the passage of which he conquered a king named Porus in a bloody battle, and advanced victoriously through the northwest of India, and intended to proceed as far as the Ganges, when the murmurs of his army compelled him to return. On the Hydaspes he built a fleet, in which he sent a part of his army down the river, while the rest proceeded along the banks. By the Hydaspes he reached the Acesines (Chenab), and thus the Indus, down which he sailed to the sea. Nearchus, his admiral, sailed hence to the Persian Gulf, while Alexander directed his march by land to Babylon, losing a great part of his troops in the desert through which he had to pass. In Susa he married Statira, the eldest daughter of Darius, and rewarded those of his Macedonians who had married Persian women, because it was his intention to unite the two nations as closely as possible. At Opis, on the Tigris, a mutiny arose among his Macedonians (in 324), who thought he showed too much favor to the Asiatics. By firmness and policy he succeeded in quelling this rising, and sent home 10,000 veterans with rich rewards. Soon after, his favorite, Hephæstion, died at Ecbatana, and Alexander's grief was unbounded. The favorite was royally buried at Babylon, and here Alexander was engaged in extensive plans for the future, when he became suddenly sick, after a banquet, and died in a few days (323 B.C.), in his thirty-third year, after a reign of twelve years and eight months. His body was after a time conveyed to Egypt with great splendor by his general Ptolemy. He left behind him an immense empire, which was divided among his chief generals, and became the scene of continual wars. The reign of Alexander constitutes an important period in the history of humanity. His career was not simply a series of empty conquests, but was attended with the most important results. The language, and much of the civilization of Greece, followed in his track; large additions were made to the sciences of geography, natural history, etc.; a road was opened to India; and the products of the farthest east were introduced into Europe. Greek kingdoms, under his generals and their successors, continued to exist in Asia for centuries.

Alexander, the name of eight popes, the earliest of whom, Alexander I, is said to have reigned from 109 to 119. The most famous (or notorious) is Alexander VI (Borgia), who was born at Valencia, in Spain, in 1431, and died in 1503. When he was only twenty-five years of age his uncle, Pope Calixtus III, made him a cardinal, and shortly afterwards appointed him to the dignified and lucrative office of vice-chancellor. He subsequently became Cardinal Bishop of Albano and in 1492, after the death of Innocent VIII, was elected Pope. As such he showed himself able and energetic, clearing Rome of the bandits who infested it and repressing the insolence and rapacity of the nobles, reformed the ecclesiastical discipline, sent many missionaries abroad and encouraged the arts, especially painting and literature. In addition he put an end to the famines which had often desolated Rome, suppressed magic in Germany and Bohemia, and issued many notable bulls and other documents, the whole going to indicate remarkable mental power and activity. Several Italian and other historians have accused him of licentiousness in his earlier career, and of simony, nepotism and cruelty as Pope, charges which it is difficult to reconcile with the high qualities manifested by him and his distinguished deeds. The accusations do not fit well with the known character of his career in the papal chair, and of

late years historians are inclined to doubt the serious accusations made against him. Not long after his election Alexander decided the dispute between Spain and Portugal concerning their claims to the new found countries beyond the ocean.

Alexander, the name of three Scottish kings. ALEXANDER I, a son of Malcolm Canmore and Margaret of England, succeeded his brother Edgar in 1107, and governed with great ability till his death in 1124. He was a great benefactor of the church, and a firm vindicator of the national independence.—ALEXANDER II was born in 1198, and succeeded his father William the Lion in 1214. He was a wise and energetic prince, and Scotland prospered greatly under him, though disturbed by the Norsemen, by the restlessness of some of the Celtic chiefs, and by the attempts of Henry III of England to make Alexander do homage to him. Alexander married Henry's sister, Joan, in 1221, who lived till 1238. In 1244 war with England almost broke out, but was fortunately averted. Alexander died in 1248 at Kerrera, an island opposite Oban, when on an expedition in which he hoped to wrest the Hebrides from Norway. He was succeeded by his son, ALEXANDER III, a boy of eight, who in 1251 married Margaret, eldest daughter of Henry III of England. Like his father he was eager to bring the Hebrides under his sway, and this he was enabled to accomplish in a few years after the defeat of the Norse King Haco at Largs, in 1263. The mainland and islands of Scotland were now under one sovereign, though Orkney and Shetland still belonged to Norway. Alexander was strenuous in asserting the independence both of the Scottish kingdom and the Scottish church against England. He died in 1285 by the falling of his horse while he was riding in the dark between Burntisland and Kinghorn. He left as his heiress Margaret, the Maiden of Norway, daughter of Eric of Norway, and of Alexander's daughter, Margaret. Under him Scotland enjoyed greater prosperity than for generations afterwards.

Alexander I, Emperor of Russia, son of Paul I and Maria, daughter of Prince Eugene of Würtemberg, was born in 1777, and died in 1825. On the assassination of his father, in 1801, Alexander ascended the throne, and one of his first acts was to conclude peace with Britain, against which his predecessor had declared war. In 1803 he offered his services as mediator between England and France, and two years later a convention was entered into between Russia, England, Austria, and Sweden for the purpose of resisting the encroachments of France on the territories of independent states. He was present at the battle of Austerlitz (1805), when the combined armies of Russia and Austria were defeated by Napoleon. In the succeeding campaign the Russians were again beaten at Eylau (8th February, 1807), and Friedland (14th June), the result of which was an interview between Alexander and Napoleon and the treaty at Tilsit. The Russian emperor now for a time identified himself with the Napoleonic schemes, and soon obtained possession of Finland and an extended territory on the Danube. The French alliance, however, he found to be too oppressive, and his having separated himself from Napoleon led to the French invasion of Russia in 1812, with its disastrous results to Napoleon. In 1813 he published a manifesto which served as the basis of the coalition of the other European powers against France, which was followed by the capture of Paris (in 1814), the abdication of Napoleon and the restoration of the Bourbons, and the utter overthrow of Napoleon the following year. After Waterloo, Alexander, accompanied by the Emperor of Austria and the King of Prussia, made his second entrance into Paris, where they concluded the treaty known as the Holy Alliance. The remaining part of his reign was chiefly taken up in measures of internal reform, including the gradual abolition of serfdom, and the promotion of education, agriculture, commerce, and manufactures, as well as literature and the fine arts.

Alexander II, Emperor of Russia, was born April 29, 1818, and succeeded his father, Nicholas, in 1855, before the end of the Crimean war. After peace was concluded the new emperor set about effecting reforms in the empire, the greatest of all being the emancipation of the serfs in 1861. He introduced education, but adopted a reactionary policy afterward and was assassinated by the Nihilists (q. v.) in St. Petersburg (Petrograd), March 13, 1881. He was succeeded by his son Alexander III.

Alexander III, Emperor of Russia, born in 1845, second son of Alexander II, succeeded to the throne on the death of his father, but not crowned until 1883. He was a reactionary, restricting education and persecuting dissenting religions. He died in 1894, and was succeeded by his son Nicholas II.

Alexander (Karageorgevitch), King of the Serb-Croat-Slovene State (Jugo-Slavia), born in 1888, son of Peter I, whom he succeeded, 1921. He married Princess Marie, Roumania, 1922.

Alexander I (Obrenovitch), king of Servia, born 1876, succeeded Milan as king in 1889 under a regency, which ended 1893. With his queen, Draga (a widow whom he married in 1900) he was murdered June 11, 1903. Succeeded by Peter I.

Alexander, Sir George, a British actor-manager (1858-1918), born at Reading, England, son of a Scottish manufacturer.

Alexander (Alexandros), King of Greece (1893-1920), second son of Constantine, whom he succeeded June 13, 1917. He died from the bite of a pet monkey Oct. 25, 1920.

Alexander of Hales. See *Hales.*

Alexander, John White, an American portrait and figure painter, born at Allegheny, Pennsylvania, October 7, 1856; died May 31, 1915. He studied at Paris and at Munich and came under the influence of Whistler. His portraits of Walt Whitman and Auguste Rodin are characteristic.

Alexander Nevskoi (nev'skoi), a Russian hero and saint, son of the Grand-duke Jaroslav, born in 1219; died in 1263. He fought valiantly against assaults of the Mongols, the Danes, Swedes, and knights of the Teutonic Order. He gained the name of *Nevskoi* in 1240, for a splendid victory, on the Neva, over the Swedes. The gratitude of his countrymen commemorated the hero in popular songs, and raised him to the dignity of a saint.

Alexander Severus (se-vē'rus), a Roman emperor, born in 208; died 235 A.D. He was raised to the imperial dignity in 222 A.D. by the prætorian guards, after they had put his cousin, the emperor Heliogabalus, to death. He governed ably both in peace and war; and also occupied himself in poetry, philosophy, and literature. In 232 he sucessfully repelled the Persians, who wished to drive the Romans from Asia. When on an expedition into Gaul to repress an incursion of the Germans, he was murdered with his mother in an insurrection that took place among his troops.

Alexanders (*Smyrnium olusātrum*), an umbelliferous biennial plant, a native of Britain, formerly cultivated for its leafstalks, which, having a pleasant aromatic flavor, were blanched and used instead of celery—a vegetable that has taken its place.

Alexandretta, or Iskanderun (ancient *Alexandria ad Issum*), a small seaport in Asia Minor, on the Gulf of Iskanderun, the port, of Aleppo and Northern Syria. Named after Alexander the Great, at whose command it was founded in memory of the battle of Issus. Pop. about 7,000.

Alexandria (al-eks-an'dri-a), an ancient city and seaport in Egypt, at the northwest angle of the Nile delta, on a ridge of land between the sea and Lake Mareotis. Ancient Alexandria was founded by, and named in honor of, Alexander the Great, in B.C. 332, and was long a great and splendid city, the center of commerce between the east and west, as well as of Greek learning and civilization, with a population at one time of perhaps 1,000,000. It was especially celebrated for its great library, and also for its famous lighthouse, one of the wonders of the world, standing upon the little island of Pharos, which was connected with the city by a mole. Under Roman rule it was the second city of the empire, and when Constantinople became the capital of the East it still remained the chief center of trade; but it received a blow from which it never recovered when captured by Amru, general of Caliph Omar in 641, after a siege of fourteen months. Its ruin was finally completed by the discovery of the passage to India by the Cape of Good Hope, which opened up a new route for the Asiatic trade. See *Alexandrian Library, Alexandrian School.*

—Modern Alexandria stands partly on what was formerly the island of Pharos, partly on the peninsula which now connects it with the mainland and has been formed by the accumulation of soil, and partly on the mainland. The streets in the Turkish quarter are narrow, dirty, and irregular; in the foreign quarter they are regular and wide, and it is here that the finest houses are situated, and where are the principal shops and hotels, banks, offices of companies, etc.; this part of the city being also supplied with gas, and with water brought by the Mahmudieh Canal from the western branch of the Nile. Alexandria is connected by railway with Cairo, Rosetta, and Suez. A little to the south of the city are the catacombs, which now serve as a quarry. Another relic of antiquity is Pompey's Pillar, 98 ft. 9 in. high. Alexandria has two ports, on the east and west respectively of the isthmus of the Pharos peninsula, the latter having a breakwater over 3,000 yards in length, with fine quays and suitable railway and other accommodation. The trade of Alexandria is large and varied, the exports being cotton, beans, peas, rice, wheat, etc.; the imports chiefly manufactured goods. At the beginning of the century Alexandria

was an insignificant place of 5,000 or 6,000 inhabitants. The origin of its more recent career of prosperity it owes to Mohammed Ali. In 1882 the insurrection of Arabi Pasha and the massacre of Europeans led to the intervention of the British, and the bombardment of the forts by the British fleet in July. When the British entered the city they found the finest parts of it sacked and in flames; it is now handsomely rebuilt. Pop. (1907) 332,246.

Alexandria, a city of Madison Co., Indiana, 11 miles N. of Anderson. It has manufactures of plate glass, lamp chimneys and mineral wool. Natural gas was once plentiful here. Pop. (1910) 5096; (1920) 4172.

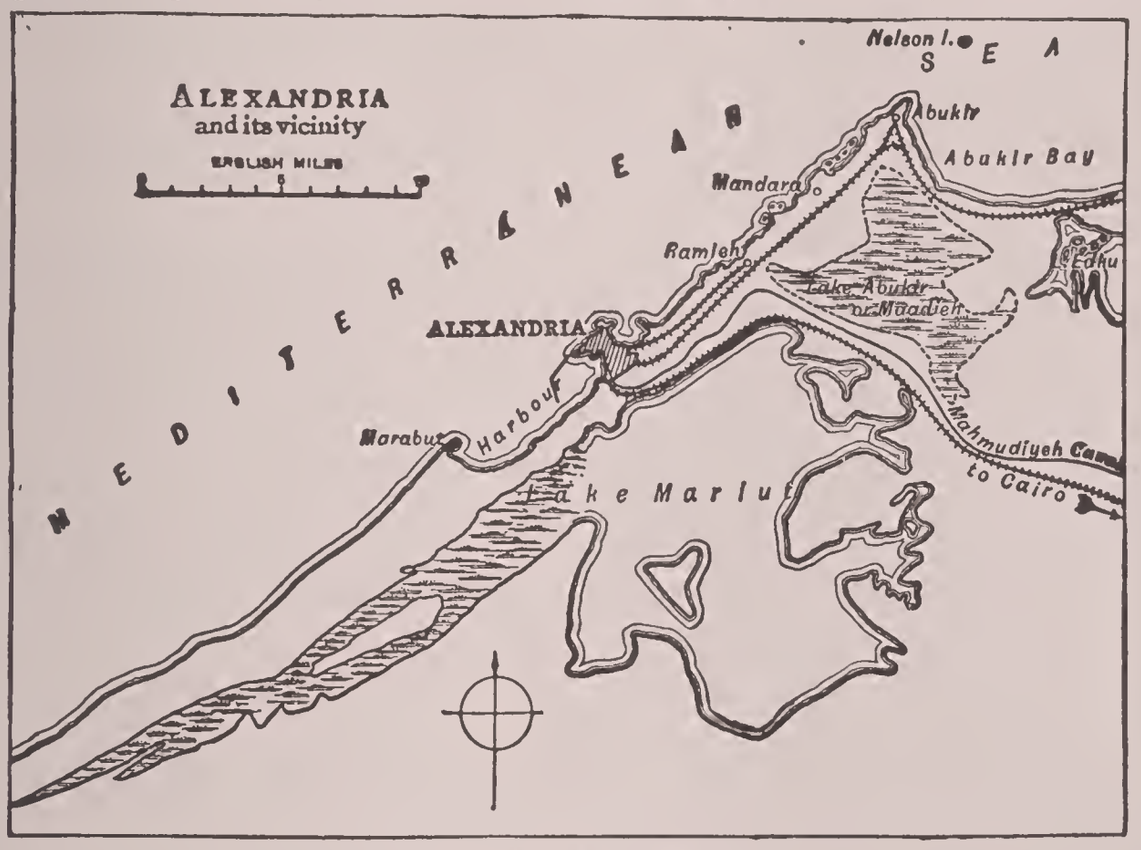
Alexandria, a city, county seat of Rapides Parish, Louisiana, on Red River and on 7 trunk lines of railroads; in the heart of the long-leaf yellow-pine territory, and in a rich farming country producing cotton, corn, alfalfa, sugar cane, etc. A distributing center. Pop. (1910) 11,213; (1920) 17,510.

Alexandria, a city and port of Virginia, on Potomac River, 6 miles below Washington. The river is a mile wide, accommodating the largest vessels. It has a ship yard, torpedo plant, glass works, etc. Seat of an Episcopal Theological Seminary. Here Braddock (q. v.) had headquarters in 1755. Pop. 18,060.

Alexandria, a town of Scotland, in Dumbartonshire, on the Leven, 4 miles north of Dumbarton, with extensive cotton printing and bleaching works. Pop. 8,000.

Alexandria, a town of Southern Russia, government of Cherson. Pop. 14,000.

Alexandrian Library, the largest and most famous of all the ancient collections of books, founded by Ptolemy Soter (died 283 B.C.), king of Egypt, and greatly enlarged by succeeding Ptolemies. At its most flourishing period it is said to have numbered 700,000 volumes, accommodated in two different buildings, one of them being the Serapeion, or temple of Jupiter Serapis. The other collection was burned during Julius Cæsar's siege of the city, but the Serapeion library existed to the time of the Emperor Theodosius the Great, when, at the general destruction of the heathen temples, the splendid temple of Jupiter Serapis was gutted (A.D. 391) by a fanatical crowd of Christians, and its literary treasures destroyed or scattered. A library was again accumulated, but is said to have been burned by the Arabs when they captured the city under the caliph Omar in 641. Amru, the captain of the caliph's army, would have been willing to spare the library, but Omar is said to have disposed of the matter in the famous words: 'If these



Environs of Alexandria, Egypt.

writings of the Greeks agree with the Koran they are useless, and need not be preserved; if they disagree they are pernicious, and ought to be destroyed.' It is probable, however, that little of the library then remained to be destroyed.

Alexandrian School, or AGE, the school or period of Greek literature and learning that existed at Alexandria in Egypt during the three hundred years that the rule of the Ptolemies lasted (323–30 B.C.). and continued under the Roman supremacy. Ptolemy Soter founded the famous library of Alexandria (see above) and his son, Philadelphus, established a kind of academy of sciences and arts. Many scholars and men of genius were thus attracted to Alexandria, and a period of literary activity set in, which made Alexandria for long the focus and center of Greek culture and intellectual effort. It must be admitted, however, that originality was not a characteristic of the Alexandrian age, which was stronger in criticism, grammar, and science than in pure literature. Among the grammarians and critics were Zenodotus, Eratosthenes, Aristophanes, Aristarchus, and Zoilus, proverbial as a captious critic. Their merit is to have collected, edited, and preserved the existing monuments of Greek literature. To the poets belong Apollonius, Lycophron, Aratus, Nicander, Euphorion, Callimachus, Theocritus, Philetas, etc. Among those who pursued mathematics, physics, and astronomy was Euclid, the father of scientific geometry; Archimedes, great in physics and mechanics; Apollonius of Perga, whose work on conic sections still exists; Nicomachus, the first scientific arithmetician; and (under the Romans) the astronomer and geographer Ptolemy. Alexandria also was distinguished in philosophical speculation, and it was here that the New Platonic school was established at the close of the second century after Christ by Ammonius of Alexandria (about 193 A.D.), whose disciples were Plotinus and Origen. Being for the most part oriental, formed by the study of Greek learning, the writings of the New Platonists are strikingly characterized—for example, those of Ammonius Saccas, Plotinus, Iamblicus, Porphyrius—by a mixture of Asiatic and European elements. The principal Gnostic systems also had their origin in Alexandria.

Alexandrian Version, or CODEX ALEXANDRINUS, a manuscript in the British Museum, of great importance in Biblical criticism, written on parchment with uncial letters, and belonging probably to the latter half of the fifth century. It contains the whole Greek Bible (the Old Testament being according to the Septuagint), together with the letters of Bishop Clement of Rome, but it wants parts of Matthew, John, and Second Corinthians. The Patriarch of Constantinople, who in 1628 sent this manuscript as a present to Charles I, said he had received it from Egypt (whence its name).

Alexandrine (al-ex-an'drēn), in prosody, the name given, from an old French poem on Alexander the Great, to a species of verse, which consists of six iambic feet, or twelve syllables, the pause being, in correct Alexandrines, always on the sixth syllable; for example, the second of the following verses:—

A needless Alexandrine ends the song,
Which, like a wounded snake, drags its slow length along.

In English, Drayton's *Polyolbion* is written in this measure, and the concluding line of the Spenserian stanza is an Alexandrine. The French in their epics and dramas are confined to this verse, which for this reason is called by them the *heroic.*

Alexandropol (drō'pol), a Russian town and fortress in the Transcaucasian government of Erivan, near the highway from Erivan to Kars; can accommodate 10,000 military, and has silk manufactures. Pop. 32,018.

Alexan'drov, a town of Russia, government of Vladimir, with a famous convent, in the church of which are interred two sisters of Peter the Great; manufactures of steel and cotton goods. In the neighborhood is an imperial stud. Pop. 6,848.

Alexisbad (ä-leks'is-bäd), a bathing place of Germany, Anhalt. in the Harz Mountains, with two mineral springs strongly impregnated with iron.

Alexis Michai'lovitch (a-leks'is; the son of Michael), or MIKHAILOVITCH, the second Russian czar of the line of Romanof, born in 1629, succeeded his father Michael Feodorovitch in 1645, and died in 1676. He did much for the internal administration and for the enlargement of the empire: reconquered Little Russia from Poland, and carried his authority to the extreme east of Siberia. He was father of Peter the Great.

Alexis Petro'vitch, eldest son of Peter the Great, was born in Moscow, 1690, and died in 1718. He opposed the innovations introduced by his father, who on this account

disinherited him by a ukase in 1718, and when he discovered that Alexis was paving the way to succeed to the crown he had his son tried and condemned to death. He was found dead in prison a few days later, the cause of his death not known. He left a son, afterwards the emperor Peter II.

Alexius Comne'nus (a-leks'i-us), a Byzantine emperor, was born in 1048, and died in 1118. He was a nephew of Isaac, the first emperor of the Comneni, and attained the throne in 1081, at a time when the empire was menaced from various sides, especially by the Turks and the Normans. From these dangers, as well as from later ones (caused by the First Crusade, the Normans, and the Turks), he managed to extricate himself by policy or warlike measures, and maintained his position till the age of seventy, during a reign of thirty-seven years.

Al'fa, a name for esparto grass or a variety of it, largely obtained from Algeria. See *Esparto.*

Alfalfa (al-fal'fa), a prolific forage plant, also called lucerne (q. v.), widely grown in Europe and in parts of North and South America. It is grown in every state of the Union, and in most of the provinces of Canada. Heavy crops may be gathered three or more times each season. Alfalfa succeeds best on soils of medium texture that are capable of deep penetration by roots and well supplied with mineral plant foods. It is a perennial and under favorable conditions lives many years and attains a large size.

Alfarabi (âl-fa-rä'bē), an eminent Arabian scholar of the tenth century; died at Damascus in 950; wrote on the Aristotelian philosophy, and compiled a kind of encyclopedia.

Alfieri (âl-fē-ā'rē), VITTORIO, COUNT, Italian poet, was born at Asti in 1749, and died in 1803. After extensive European travels he began to write, and his first play, *Cleopatra* (1775), being received with general applause, he determined to devote all his efforts to attaining a position among writers of dramatic poetry. At Florence he became intimate with the Countess of Albany, wife of Prince Charles Edward Stuart, and on the death of the prince she lived with him as his mistress. This connection he believed to have served to stimulate and elevate his poetic powers. He died at Florence and was buried in the church of Santa Croce, between Machiavelli and Michael Angelo, where a beautiful monument by Canova covers his remains. He wrote twenty-one tragedies and six comedies. His tragedies are full of lofty and patriotic sentiments, but the language is stiff and without poetic grace, and the plots poor. Nevertheless he is considered the first tragic writer of Italy, and has served as a model for his successors. Alfieri composed also an epic, lyrics, satires, and poetical translations from the ancient classics. He left an interesting autobiography.

Alfon'so. See *Alphonso.*

Al'ford, HENRY, Dean of Canterbury, an English poet, scholar and miscellaneous writer, was born in London in 1810. After attending various schools he graduated from Cambridge and in 1835 became vicar of Wymeswold, Leicestershire. In 1842 he was appointed examiner in logic and moral philosophy to the University of London, and held the appointment till 1857. He early began the great work of his life, his edition of the Greek Testament with commentary, which occupied him for twenty years, the first volume being published in 1849, the fourth and last in 1861. In 1853 he was translated to Quebec Chapel, London, and in 1857 he was appointed Dean of Canterbury. He died in 1871.

Al'fred (or ÆL'FRED) THE GREAT, King of England, one of the most illustrious rulers on record, was born at Wantage, in Berkshire, A.D. 849, his father being Ethelwolf, son of Egbert, King of the West Saxons. He succeeded his brother Ethelred in 872, at a time when the Danes, or Northmen, had extended their conquests widely over the country, and they had completely overrun the kingdom of the West Saxons by 878. Alfred was obliged to flee in disguise, and stayed for some time with one of his own neat-herds. At length he gathered a small force, and having fortified himself on the Isle of Athelney, formed by the confluence of the rivers Parret and Tone, amid the marshes of Somerset, he was able to make frequent sallies against the enemy. It was during his abode here that he went, if the story is true, disguised as a harper into the camp of King Guthrum (or Guthorm), and, having ascertained that the Danes felt themselves secure, hastened back to his troops, led them against the enemy, and gained such a decided victory that fourteen days afterwards the Danes begged for peace. This battle took place in May, 878, near Edington, in Wiltshire. Alfred allowed the Danes who were already in the country to remain, on condition that they gave hostages, took a solemn oath to quit Wessex, and embraced Christianity. Their king, Guthrum, was

baptized, with thirty of his followers, and afterwards remained faithful to Alfred. They received that portion of the east of England now occupied by the counties of Norfolk, Suffolk, and Cambridge, as a place of residence. The few years of tranquillity (886–893) which followed were employed by Alfred in rebuilding the towns that had suffered most during the war, particularly London; in training his people in arms and no less in agriculture; in improving the navy; in systematizing the laws and internal administration; and in literary labors and the advancement of learning. He caused many manuscripts to be translated from Latin, and himself translated several works into Anglo-Saxon, such as the *Psalms*, *Æsop's Fables*, Boethius on the *Consolation of Philosophy*, the *History of Orosius*, Bede's *Ecclesiastical History*, etc. He also drew up several original works in Anglo-Saxon. These peaceful labors were interrupted, about 894, by an invasion of the Northmen, who, after a struggle of three years, were finally driven out. Alfred died in 901. He had married, in 868, Alswith or Ealhswith, the daughter of a Mercian nobleman, and left two sons, Edward, who succeeded him, and Ethelwerd, who died in 922. Alfred presents us with one of the most perfect examples of the able and patriotic monarch united with the virtuous man.

Algæ (al'jē), a nat. order of cryptogamic or thallogenous plants, found for the most part in the sea and fresh water, and comprising sea-weeds, etc. The higher forms have stems bearing leaf-like expansions, and they are often attached to the rocks by roots, which, however, do not derive nutriment from the rocks. A stem, however, is most frequently absent. The plants are nourished through their whole surface by the medium in which they live. They vary in size from microscopic diatoms to forms whose stems resemble those of forest trees, and whose fronds rival the leaves of the palm. They are entirely composed of cellular tissue, and many are edible and nutritious, as carrageen or Irish moss, dulse, etc. Kelp, iodine, and bromine are products of various species. The Algæ are also valuable as manure. They may be divided into four groups:—*Cyanophyceæ* (blue), *Chlorophyceæ* (green), *Phæophyceæ* (brown), and *Rhodophyceæ* (red).

Algardi (äl-gar'dē), Alessandro, an Italian sculptor of the 17th century; born 1602; died 1654. He worked chiefly at Rome; executed the tomb of Leo XI in St. Peter's, and a relief with life-size figures over the altar of St. Leo there.

Algaro'ba bean. See *Carob-tree.*

Algarobilla (al-gar-o-bil'la), the seed-pods of one or two South American trees (genus *Prosōpis*), valuable as containing much tannin.

Algarot (al'ga-rot), a violently purgative and emetic white powder, precipitated from chloride of antimony in water; formerly used in medicine.

Algarotti (äl-gä-rot'tē), Francesco, Count, born in 1712, died in 1764, an Italian writer on science, the fine arts, etc. He lived for some years in France and for a long time in Germany, Frederick the Great of Prussia having made him chamberlain and count. He wrote *Newtonianism for the Ladies; Essays on the Fine Arts;* poems, letters, etc.

Algarve (ål-gär'vā), a maritime province of Portugal occupying the southern portion of the republic; mountainous but with some fertile tracts. Area, 1937 square miles; pop. 274 122.

Algau (ål'gou), a name for the south-western portion of Bavaria and the adjacent parts of Würtemberg and Tyrol, intersected by the Algau Alps. The Algau breed of cattle is one of the best in Germany.

Algazzali (al-gäz-ä'lē), Abu Hamed Mohammed, an Arabian philosopher, Persian by birth; born 1058, died 1111. He was a most prolific author; an opponent of the prevailing Aristotelian philosophy of the day, and wrote against it the *Destruction of the Philosophers*, answered by Averroes in his *Destruction of the Destruction.*

Algebra (al'je-bra), a kind of generalized arithmetic, in which numbers or quantities and operations, often also the results of operations, are represented by symbols. Thus the expression $xy+cz+dy^2$ denotes that a number represented by x is to be multiplied by a number represented by y, a number c multiplied by a number z, a number d by a number y multiplied by itself (or squared), and the sum taken of these three products. So the *equation* (as it is called) $x^2-7x+12=0$ expresses the fact that if a certain number x is multiplied by itself, and this result made less by seven times the number and greater by twelve, the result is 0. In this case x must either be 3 or 4 to produce the given result; but such an equation (or formula) as $(a+b)(a-b)=a^2-b^2$ is always true whatever values may be assigned to a and b. Algebra is an invaluable instrument in intricate calculations

of all kinds, and enables operations to be performed and results obtained that by arithmetic would be impossible, and its scope is still being extended.

The beginnings of algebraic method are to be found in Diophantus, a Greek of the fourth century of our era, but it was the Arabians that introduced algebra to Europe, and from them it received its name. The first Arabian treatise on algebra was published in the reign of the great Kaliph Al Mamun (813–833) by Mohammed Ben Musa. In 1202 Leonardo Fibonacci of Pisa, who had traveled and studied in the East, published a work treating of algebra as then understood in the Arabian school. From this time to the discovery of printing considerable attention was given to algebra, and the work of Ben Musa and another Arabian treatise, called the *Rule of Algebra*, were translated into Italian. The first printed work treating on algebra (also on arithmetic, etc.) appeared at Venice in 1494, the author being a monk called Luca Pacioli da Bergo. Rapid progress now began to be made, and among the names of those to whom advances are to be attributed are Tartaglia and Cardan. About the middle of the sixteenth century the German Stifel introduced the signs +, −, √, and Recorde the sign =. Recorde wrote the first English work on algebra. François Vieta, a French mathematician (1540–1603), first adopted the method which has led to so great an extension of modern algebra, by being the first who used general symbols for known quantities as well as for unknown. It was he also who first made the application of algebra to geometry. Albert Girard extended the theory of equations by the supposition of imaginary quantities. The Englishman Harriot, early in the seventeenth century, discovered negative roots, and established the equality between the number of roots and the units in the degree of the equation. He also invented the signs < >, and Oughthred that of ×. Descartes, though not the first to apply algebra to geometry, has, by the extent and importance of his applications, commonly acquired the credit of being so. The same discoveries have also been attributed to him as to Harriot, and their respective claims have caused much controversy. He obtained by means of algebra the definition and description of curves. Since his time algebra has been applied so widely in geometry and higher mathematics that we need only mention the names of Fermat, Wallis, Newton, Leibnitz, De Moivre, MacLaurin, Taylor, Euler. d'Alembert, Lagrange, Laplace, Fourier, Poisson, Gauss, Horner, de Morgan, Sylvester, Cayley, Boole, Jevons, and others who have applied the algebraic method not only to formal logic but to political economy.

Algeciras (ål-*he*-thē'rås), a seaport of Spain, on the west side of the Bay of Gibraltar, a well-built town carrying on a brisk coasting trade. It was the first conquest of the Arabs in Spain (711), and was held by them till 1344, when it was taken by Alphonso XI of Castile after a siege of twenty months. Near Algeciras, in July, 1801, the English defeated the French and Spanish fleets. A conference was held here in 1906 to settle the dispute between France and Germany about Morocco. Pop. 13,302.

Alger (al'jer), Russell A., soldier and statesman, born at Lafayette, Ohio, 1836. After admission to the bar he entered the army as a private in 1861 and served through the war, rising to the rank of brevet-major-general of volunteers. Engaging in business in Michigan, he became governor of that State in 1885, and in 1897 was appointed Secretary of War by President McKinley. He resigned in 1899, having been severely criticised for his management of army affairs during the Spanish-American war. He was appointed United States Senator in 1902 to fill a vacancy and elected 1903. Died January 24, 1907.

Al'ger, William Rounsville, author and clergyman; born in Freetown, Massachusetts, in 1823, died in 1905. He succeeded Theodore Parker as pastor of the Society of Liberal Christians in Boston in 1855, and was minister of the Unitarian Church of the Messiah in New York 1876–78. He wrote *Symbolic History of the Cross of Christ; Oriental Poetry; Sources of Consolation in Human Life*, and other works.

Algeria (al-je'ri-a), a French colony in North Africa, having on the north the Mediterranean, on the east Tunis, on the west Morocco, and on the south (where the boundary is ill-defined) the desert of Sahara; area, exclusive of the Algerian Sahara, 176,800 sq. miles. The country is divided into three departments—Algiers, Oran, and Constantine. The coast-line is about 550 miles in length, steep and rocky, and though the indentations are numerous the harbors are much exposed to the north wind. The country is traversed by the Atlas Mountains, two chains of which—the Great Atlas, bordering on the Sahara, and the Little, or Maritime Atlas, between it and the sea—run parallel to the coast, the former attaining a height of 7,000 feet.

The intervals are filled with lower ranges, and numerous transverse ranges connect the principal ones and run from them to the coast, forming elevated tablelands and inclosed valleys. The rivers are numerous, but many of them are mere torrents rising in the mountains near the coast. The Shelif is much the largest. Some of the rivers are largely used for irrigation, and artesian wells have been sunk in some places for the same purpose. There are, both on the coast and in the interior, extensive salt lakes or marshes (*Shotts*), which dry up to a great extent in summer. The country bordering on the coast, called the *Tell*, is generally hilly, with fertile valleys; in some places a flat and fertile plain extends between the hills and the sea. In the east there are *Shotts* that sink below the sea-level, and into these it has been proposed to introduce the waters of the Mediterranean. The climate varies considerably according to elevation and local peculiarities. There are three seasons: winter from November to February, spring from March to June, and summer from July to October. The summer is very hot and dry. In many parts of the coast the temperature is moderate and the climate so healthy that Algeria is now a winter resort for invalids.

The chief products of cultivation are wheat, barley, and oats, tobacco, cotton, wine, silk, and dates. Early vegetables, especially potatoes and peas, are exported to France and England. A fiber called *alfa*, a variety of esparto, which grows wild on the high plateaus, is exported in large quantities. Cork is also exported. There are valuable forests, in which grow various sorts of pines and oaks, ash, cedar, myrtle, pistachio-nut, mastic, carob, etc. The Australian *Eucalyptus globulus* (a gum-tree) has been successfully introduced. Agriculture often suffers much from the ravages of locusts. Among wild animals are the lion, panther, hyena, and jackal; the domestic quadrupeds include the horse, the mule, cattle, sheep, and pigs (introduced by the French). Algeria possesses valuable minerals, including iron, copper, lead, sulphur, zinc, antimony, marble (white and red), and lithographic stone.

The trade of Algeria has greatly increased under French rule, France, Spain, and England being the countries with which it is principally carried on, and three-fourths of the whole being with France. The exports (besides those mentioned above) are olive-oil, raw hides, wood, wool, tobacco, oranges, etc.; the imports, manufactured goods, wines, spirits, coffee, etc. The manufacturing industries are unimportant, and include morocco leather, carpets, muslins, and silks. French money, weights, and measures are generally used. The chief towns are Algiers, Oran, Constantine, Bona, and Tlemçen.

The two principal native races inhabiting Algeria are Arabs and Berbers. The former are mostly nomads, dwelling in tents and wandering from place to place, though a large number of them are settled in the Tell, where they carry on agriculture and have formed numerous villages. The Berbers, here called Kabyles, are the original inhabitants of the territory and still form a considerable part of the population. They speak the Berber language, but use Arabic characters in writing. The Jews form a small but influential part of the population. Various other races also exist. Except the Jews all the native races are Mohammedans. There are now a considerable number of French and other colonists, provision being made for granting them concessions of land on certain conditions. There are over 360,000 colonists of French origin in Algeria, and over 200,000 colonists natives of other European countries (chiefly Spaniards and Italians). Algeria is governed by a governor-general, who is assisted by a council appointed by the French government. The settled portion of the country, in the three departments of Algiers, Constantine, and Oran, is treated much as if it were a part of France, and each department sends two deputies and one senator to the French chambers. Pop. 5,231,850.

The country now called Algeria was known to the Romans as Numidia. It flourished greatly under their rule, and early received the Christian religion. It was conquered by the Vandals in 430–431 A.D., and recovered by Belisarius for the Byzantine Empire in 533–534. About the middle of the seventh century it was overrun by the Saracens. The town of Algiers was founded about 935 by Yussef Ibn Zeiri, and the country was subsequently ruled by his successors and the dynasties of the Almoravides and Almohades. After the overthrow of the latter, about 1269, it broke up into a number of small independent territories. The Moors and Jews who were driven out of Spain by Ferdinand and Isabella at the end of the fifteenth century settled in large numbers in Algeria, and revenged themselves on their persecutors by the practice of piracy. On this account various expeditions were made by Spain against Algeria, and by 1510 the greater part of the country was made tributary. A few years later the Algerians invited to their assis-

tance the Turkish pirate Horush (or Haruj) Barbarossa, who made himself Sultan of Algiers in 1516, but was not long in being taken by the Spaniards and beheaded. His brother and successor put Algiers under the protection of Turkey (about 1520), and organized the system of piracy which was long the terror of European commerce, and was never wholly suppressed till the French occupation. Henceforth the country belonged to the Turkish empire, though from 1710 the connection was little more than nominal. The depredations of the Algerian pirates were a continual source of irritation to the Christian powers, who sent a long series of expeditions against them. For instance, in 1815 a United States fleet under Admiral Decatur defeated an Algerian one and forced the dey to agree to a peace in which he recognized the American flag as inviolable. In 1816 Lord Exmouth with an English fleet bombarded Algiers, and exacted a treaty by which all the Christian slaves were at once released, and the dey undertook for the future to treat all his prisoners of war as the European law of nations demanded. But the piratical practices of the Algerians were soon renewed.

At last the French determined on more vigorous measures, and in 1830 sent a force of over 40,000 men against the country. Algiers was speedily occupied, the dey retired, and the country was without a government, but resistance was organized by Abd-el-Kader, an Arab chief whom the emergency had raised up. He began his warlike career of fifteen years by an attack on Oran in 1832, and after an obstinate struggle the French, in February, 1834, consented to a peace acknowledging him as ruling over all the Arab tribes west of the Shelif by the title of Emir of Maskara. War was soon again renewed with varying fortune, and in 1837, in order to have their hands free in attacking Constantine, the French made peace with Abd-el-Kader, leaving to him the whole of Western Algeria except some coast towns. Constantine was now taken, and the subjugation of the province of Constantine followed. Meanwhile Abd-el-Kader was preparing for another conflict, and in November, 1838, he suddenly broke into French territory with a strong force, and for a time the supremacy of the French was endangered. Matters took a more favorable turn for them when General Bugeaud was appointed governor-general in February, 1841. In the autumn of 1841 Saida, the last fortress of Abd-el-Kader, fell into his hands, after which the only region that held out against the French was that bordering on Morocco. Early in the following year this also was conquered, and Abd-el-Kader found himself compelled to seek refuge in the adjoining empire. From Morocco Abd-el-Kader twice made a descent upon Algeria, on the second occasion defeating the French in two battles; and in 1844 he even succeeded in raising an army in Morocco to withstand the French. Bugeaud, however, crossed the frontier, and inflicted a severe defeat on this army, while a French fleet bombarded the towns on the coast. The Emperor of Morocco was at length compelled to agree to a treaty, in which he not only promised to refuse Abd-el-Kader his assistance, but even engaged to lend his assistance against him. Reduced to extremities, Abd-el-Kader surrendered on 27th December, 1847, and was at first taken to France a prisoner, but was afterwards released on his promise not to return to Algeria. The country was yet far from subdued, and the numerous risings that successively took place rendered Algeria a school for French generals, such as Pélissier, Canrobert, St. Arnaud, and Macmahon. In 1864 Macmahon succeeded Pélissier as governor-general. About this time the emperor Napoleon III, who had visited the colony, introduced considerable modifications into the government. Fresh disturbances broke out in the south nearly every year till 1871, when, during the Franco-German war, a great effort was made to establish independence. The insurrection was suppressed, and with the substitution of a civil government for the military régime peace was established. By a French law of 1919 all natives who served in the European war, who are proprietors or farmers, who can read or write or hold a French decoration, are ranked as citizens of the French Republic.

Algesi'ras. See ALGECIRAS.

Alghero, or ALGHERI (ål-gā'rō, ål-gā'rē), a fortified town and seaport on the N. W. coast of the island of Sardinia, 15 miles S. W. of Sassari; the seat of a bishop, with a handsome cathedral. Pop. 11,337.

Algiers (al'jērz), a city and seaport on the Mediterranean, capital of Algeria, on the Bay of Algiers, partly on the slope of a hill facing the sea. The old town, which is the higher, is oriental in appearance, with narrow, crooked streets, and houses that are strong, prison-like edifices. The modern French town, which occupies the lower slope and spreads along the shore, is handsomely built, with broad streets and

elegant squares. It contains the government buildings, the central military and civil establishments, the barracks, the residence of the governor-general and the officials of the general and provincial government, the superior courts of justice, the archbishop's palace and the cathedral, an English church and library, the great commercial establishments, etc. A fine boulevard built on a series of arches, and bordered on one side by handsome buildings, runs along the sea front of the town overlooking the bay, harbor, and shipping. Forty feet below are the quay and railway-station, reached by inclined roads leading from the center of the boulevard. The harbor is good and capacious, and it and the city are defended by a strong series of fortifications. There is a large shipping trade carried on. The climate of Algiers, though extremely variable, makes it a very desirable winter residence for invalids and others from colder regions. Though warm, it is bracing and tonic, and not of a relaxing character. There is a considerable rainfall (average 29 in.), but the dry air and absorbent soil prevent it from being disagreeable. The winter months resemble a bright, sunny English autumn, while the heat of summer is not so intense as that of Egypt. The sirocco or desert wind is troublesome, however, during summer, but in the winter it is merely a pleasant, warm, dry breeze. Hail-storms are not unfrequent, but frost and snow in Algiers are so rare as to be almost unknown. Pop. (1915) 172,394.

Algin (al'jin), a viscous, gummy substance obtained from certain seaweeds, more especially those of the genus *Laminaria*. It can be utilized for all purposes where starch or gum is now required; may be used in cookery for soups and jellies; and in an insoluble form it can be cut, turned, and polished, like horn or vulcanite.

Algoa Bay (al-gō'a), a bay on the south coast of Cape Colony, 425 miles E. from the Cape of Good Hope, the only place of shelter on this coast for vessels during the prevailing northwest gales. The usual anchorage is off Port Elizabeth, on the west coast, now a place of large and increasing trade.

Algol (al-gol'), a star in the constellation Perseus (head of Medusa), remarkable as a variable star, changing in brightness from the second to the fifth magnitude.

Algoma (al-gō'ma), a district of Canada, on the north side of Lake Superior, forming the northwest portion of Ontario, rich in silver, copper, iron, etc. Area 43,132 sq. miles; pop. about 57,000.

Algonkian (al-gon'ki-an) PERIOD, an American geological period between the Archæan and the Cambrian. It is almost anterior to the fossil era, though there are carbonaceous deposits of possible organic origin and a few doubtful fossil indications. These rocks are developed on an enormous scale in the Lake Superior region, and contain deposits of copper and iron.

Algonkins (al-gon'kins), a family of North American Indians, formerly spread over a great extent of territory, and still forming a large proportion of the Indians of Canada. They consisted of four groups, namely—(1) the eastern group, comprising the Massachusetts, Narragansetts, Mohicans, Delawares, and other tribes; (2) the northeastern group, consisting of the Abenakis, etc.; (3) the western group, made up of the Shawnees, Miamis, Illinois, etc.; and (4) the northwestern group, including the Chippewas or Ojibbewas, the largest of all the tribes.

Alguacil, Alguazil (ål-gwå-thēl'), in Spain an officer whose business it is to execute the decree of a judge; a sort of constable.

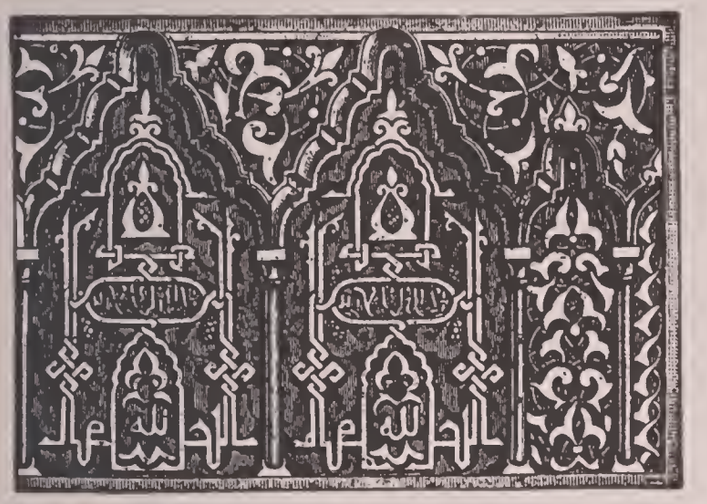
Algum. See *Almug*.

Alha'gi. See *Camel's-thorn*.

Alhama (ål-lä'må; that is, the bath), a town of Southern Spain, province of Granada, on the Motril, 25 miles southwest of Granada, celebrated for its warm medicinal (sulphur) baths and drinking waters. It formed a Moorish fortress, the recovery of which in 1482 by the Spaniards led to the entire conquest of Granada. It was thrown into ruins by an earthquake in Dec., 1884. Pop. 7679. There is also an ALHAMA in the province of Murcia, with a warm mineral spring. Pop. 8461.

Alham'bra (Arabic, *Kelât-al-hamrah*, 'the red castle'), a famous group of buildings in Spain, forming the citadel of Granada when that city was one of the principal seats of the empire of the Moors in Spain, situated on a height, surrounded by a wall flanked by many towers, and having a circuit of 2¼ miles. Within the circuit of the walls are two churches, a number of mean houses, and some straggling gardens, besides the palace of Charles V and the celebrated Moorish palace which is often distinctively spoken of as the Alhambra. This building, to which the celebrity of the site is entirely due, was the royal palace

of the kings of Granada. The greater part of the present building belongs to the first half of the 14th century. It consists mainly of buildings surrounding two oblong courts, the one called the Court of the Fishpond (or of the Myrtles), 138 by 74 feet, lying north and south; the other, called the Court of the Lions, from a fountain ornamented with twelve lions in marble, 115 by 66 feet, lying east and west, described as being, with the apartments that surround it, 'the gem of Arabian art in Spain, its most beautiful and most perfect example.' Its design is elaborate, exhibiting a profusion of exquisite detail gorgeous in coloring, but the smallness of its size deprives it of the element of majesty. The peristyle or portico on each side is supported by 128 pillars of white marble, 11 feet high, sometimes placed singly and sometimes in groups. Two pavilions project into the court at each end, the domed roof of one having been lately restored. Some of the finest chambers of the Alhambra open into this court, and near the entrance a museum of Moorish remains has been formed. The prevalence of stucco or plaster ornamentation is one of the features of the Alhambra, which becomes especially remarkable in the beautiful honeycomb stalactital pendentives which the ceilings exhibit. Arabesques and geometrical designs with interwoven inscriptions are present in the richest profusion. See works by Washington Irving, Owen Jones, and J. C. Murphy.



Alhambra—Moorish Ornament.

Alhambra, a city of Los Angeles Co., Cal., 7 miles E. of Los Angeles. It is a city of homes in the midst of orange and other fruit groves. City management form of government. Pop. (1900) 808; (1910) 5021; (1920) 9096.

Alhaurin (ål-ou-rēn'), a town of Southern Spain, 20 miles W. of Malaga, with sulphur baths. Pop. 8601.

Ali (å'lē), cousin and son-in-law of Mohammed, the first of his converts, and the bravest and most faithful of his adherents, born A.D. 602. He married Fatima, the daughter of the prophet, but after the death of Mohammed (632) his claims to the caliphate were set aside in favor successively of Abu-Bekr, Omar, and Othman. On the assassination of Othman, in A.D. 656, he became caliph, and after a series of struggles with his opponents, including Ayesha, widow of Mohammed, finally lost his life by assassination at Kufa in 661. A Mohammedan schism arose after his death, and has produced two sects. One sect, called the Shiites, put Ali on a level with Mohammed, and do not acknowledge the three caliphs who preceded Ali. They are regarded as heretics by the other sect, called Sunnites. The maxims and hymns of Ali are yet extant. See *Caliph*.

Ali, PASHA OF YANINA, generally called *Ali Pasha*, a bold and able, but ferocious and unscrupulous Albanian, born in 1741, son of an Albanian chief who was deprived of his territories by rapacious neighbors. Ali by his enterprise and success, and by his entire want of scruple, got possession of more than his father had lost, and made himself master of a large part of Albania, including Yanina, which the Porte sanctioned his holding, with the title of pasha. He then as a ruler displayed excellent qualities, putting an end to brigandage and anarchy, making roads, and encouraging commerce. He still farther extended his sway by subduing the brave Suliotes of Epirus, whom he conquered in 1803, after a three years' war. He had long been aiming at independent sovereignty, and had intrigued alternately with England, France, and Russia, and finally became almost independent of the Porte, which at length determined to put an end to his power; and in 1820 Sultan Mahmoud pronounced his deposition. Ali resisted several pashas who were sent to carry out this decision, only surrendering at last in 1822, on receiving assurances that his life and property should be granted him. Faith was not kept with him, however; he was killed, and his head was cut off and conveyed to Constantinople, while his treasures were seized by the Porte.

Alias (ā'li-as, Latin, 'on another occasion,' 'otherwise'), a word often used in judicial proceedings in connection with the different names that persons have assumed, most likely for

prudential reasons at different times, and in order to conceal identity, as Joseph Smith *alias* Thomas Jones.

Aliaska (ä-li-äs'kä), the southwestern peninsula of Alaska Territory, N. America.

Alibert (å-lē-bār), JEAN LOUIS BARON, a distinguished French physician, born 1766, died 1837, wrote many valuable works on medical subjects.

Ali Bey, a ruler of Egypt, born in the Caucasus in 1728, was taken to Cairo and sold as a slave, but having entered the force of the Mamelukes, and attained the first dignity among them, he succeeded in making himself virtual governor of Egypt. He then refused the customary tribute to the Porte, and coined money in his own name. In 1769 he took advantage of a war in which the Porte was engaged with Russia to endeavor to add Syria and Palestine to his Egyptian dominion, and in this he had almost succeeded, when the defection of his own adopted son, Mohammed Bey, drove him from Egypt. Joining his ally Sheikh Daher in Syria, he still pursued his plans of conquest with remarkable success, till in 1773 he was induced to make the attempt to recover Egypt with insufficient means. In a battle near Cairo his army was completely defeated and he himself taken prisoner, dying a few days afterwards either of his wounds or by poison.

Alibi (al'i-bī, L., 'elsewhere'), a defense in criminal procedure by which the accused endeavors to prove that when the alleged crime was committed he was present in a different place.

Alicante (å-lē-kän'tā), a fortified town and Mediterranean seaport in Spain, capital of the province of the same name, picturesquely situated partly on the slope of a hill, partly on the plain at the foot, about 80 miles S. by W. of Valencia. The lower town has wide and well-built streets; the upper town is old and irregularly built. The principal manufactures are cotton, linen, and cigars, the government cigar factory employing about 6000 women. The chief export is wine, which largely goes to England. Alicante is an ancient town and in 718 was taken by the Moors, from whom it was recovered about 1240. In modern times it has been several times besieged and bombarded, as by the French in 1709 and in 1812, and by the people of Cartagena during the commotions of 1873. Pop. 50,142.—The province is very fruitful and well cultivated, producing wine, silk, fruits, etc. The wine is of a dark color (hence called *vino tinto*, deep-colored wine), and is heavy and sweet. Area 2096 sq. miles. Pop. 470,149.

Alicata, or LICATA (å-lē-kä'tå, lē-kä'-tä), the most important commercial town on the S. coast of Sicily, at the mouth of the Salso, 24 miles E. S. E. of Girgenti, with a considerable trade in sulphur, grain, wine, oil, nuts, almonds, and soda. It occupies the site of the town which the Tyrant Phintias of Acragas erected and named after himself, when Gela was destroyed in 280. Pop. 22,031.

Alien (āl'yen), a person born out of the jurisdiction of a country, and not having acquired the full rights of a citizen of it. The position of aliens depends upon the laws of the respective countries. but generally speaking aliens owe a local allegiance, and are bound equally with natives to obey all general rules for the preservation of order which do not relate specially to citizens. Aliens have been often treated with great harshness by the laws of some states. Thus in France there long existed what was known as the *droit d'aubaine*, a law which claimed for the benefit of the state the effects of deceased foreigners leaving no heirs who were natives. Aliens have been repeatedly the objects of legislation in Britain, and the tendency at the present day is to communicate some of the rights of citizenship to aliens, and to widen the definition of subjects. It used to be a principle in English law, that a natural-born subject could not divest himself of his allegiance by becoming naturalized in a foreign state; but it is now laid down that a British subject who has voluntarily become naturalized in a foreign state thereby ceases to be a British subject. In the United States the position of aliens as regards acquisition and holding of real property differs somewhat in the different states, though in recent times the disabilities of aliens have been removed in most of them. They can take, hold, and dispose of personal property like native citizens. Individual states have no jurisdiction on the subject of naturalization, though they may pass laws admitting aliens to any privilege short of citizenship. A naturalized citizen is not eligible to election as president or vice-president of the United States, and cannot serve as senator until after nine years' citizenship, nor as a member of the house of representatives until after seven years' citizenship. Five years' residence in the United States and one year's permanent residence in the particular state where the application is made are necessary for the attainment of citizenship.

Alien and Sedition Laws, French interference in the domestic politics of the United States caused the passage by congress, in 1798, of the Alien law, giving the president power to order aliens, whom he should adjudge dangerous, out of the country, and providing for the fine and imprisonment of those who refused to go. The Sedition law, passed July 14, 1798, to remain in force till March 3, 1801, imposed fine and imprisonment on conspirators to resist government measures, and on libellers and scandalizers of the government, congress, or the president. It was aimed at the newspapers hostile to the Adams administration. Restrictions governing the conduct of enemy aliens in the United States were established on November 19, 1917, by proclamation of President Wilson. It was provided that all enemy aliens must be registered, must obtain government consent to travel or change their occupations, and must report from time to time to federal and municipal officers. Enemy aliens were forbidden approach within prescribed waterfront areas and were expelled from the District of Columbia and the Panama Canal Zone. An alien property custodian was appointed with power to receive enemy property in the U. S. About $500,000,000 of enemy property was in his hands at the close of the war. About one-third of this was returned in 1920.

Alien Land Law. The passage of the Webb bill in the California Legislature in 1913 brought to the fore anew the question of the Japanese on the Pacific coast. It excludes from ownership of land 'aliens ineligible to citizenship,' although as passed, it was amended to admit such aliens to lease lands for agricultural purposes for a term not exceeding three years.

Aligarh (*a-le-gar'*), a fort and city in India, in a district of the same name in the Northwest Provinces, 84 miles southeast of Delhi. The town properly called Koel or Coel, is about 2 miles from the fort. Pop. 70,434.

Aliment (al'i-ment), food, a term which includes everything, solid or liquid, serving as nutriment for the bodily system. Aliments are of the most diverse character, but all of them must contain nutritious matter of some kind, which, being extracted by the act of digestion, enters the blood, and effects by assimilation the repair of the body. Alimentary matter, therefore, must be similar to animal substance, or transmutable into such, and must be composed in a greater or less degree of soluble parts, which easily lose their peculiar qualities in the process of digestion, and correspond to the elements of the body. The food of animals consists for the most part of substances containing little oxygen and exhibiting a high degree of chemical combination, in which respect they differ from most substances that serve as sustenance for plants, which are generally highly oxidized and exhibit little chemical combination. According to the nature of their constituents most of the aliments of animals are divided into nitrogenous (consisting of carbon, hydrogen, and oxygen along with nitrogen, and also of sulphur and phosphorus) and non-nitrogenous (consisting of carbon, hydrogen, and oxygen without nitrogen). Water and salts are usually considered as forming a third group, and, in the widest sense of the word aliment, oxygen alone, which enters the blood in the lungs, forms a fourth. The articles used as food by man do not consist entirely of nutritious substances, but with few exceptions are compounds of various nutritious with indigestible and accordingly innutritious substances. The only nitrogenous aliments are albuminous substances and these are contained largely in animal food (flesh, eggs, milk, cheese). The principal non-nitrogenous substance obtained as food from animals is fat. Sugar is so obtained in smaller quantities (in milk). While some vegetable substances also contain much albumen, very many of them are rich in starch.

The relative importance of the various nutritious substances that are taken into the system and enter the blood depends upon their chemical constitution. The albuminous substances are the most indispensable, inasmuch as they form the material by which the constant waste of the body is repaired, whence they are called by Liebig the substance-formers. They also yield heat, but the maintenance of temperature may be performed by non-nitrogenous substances. As is well known, the temperature of warm-blooded animals is considerably higher than the ordinary temperature of the surrounding air, in man about 98.6° F., and the uniformity of this temperature is maintained by the heat which is set free by the chemical processes (of oxidation) which go on within the body. The best heat-giver is fat. Albuminous matters are not only the tissue-formers of the body; they also supply the vehicle for the oxygen, since this is conveyed through the system by the albuminous blood corpuscles. Only a part of the heat developed passes away into the environment of the animal; another part is transformed within the body (in the muscles) into mechanical work. Hence it follows that the non-nitrogenous articles of food produce not merely heat but also work, but only with

the assistance of the tissue-building and oxygen-bearing albuminous matter. In general, it may be said that that aliment is wholesome which is easily soluble and is suited to the power of digestion of the individual. Man is fitted to derive nourishment alike from animal and vegetable aliment, but can live exclusively on either. The nations of the North incline generally more to animal aliments; those of the South, and the orientals, more to vegetable. The inhabitants of the most northerly regions live almost entirely upon animal food, and very largely on fat on account of its heat-giving property. See *Dietetics*, *Digestion*, *Adulteration*, etc.

Alimen'tary Canal, a name signifying the combined œsophagus, stomach, and intestines of animals. See *Œsophagus*, *Intestine*, *Stomach*.

Alimony (al'i-mun-i), in law, the allowance to which a woman is entitled while a matrimonial suit is pending between her and her husband, or after a legal separation from her husband, not occasioned by adultery or elopement on her part.

Aliquot Part (al'i-kwot), is such part of a number as will divide and measure it exactly without any remainder. For instance, 2 is an aliquot part of 4, 3 of 12, and 4 of 20.

Alismaceæ (a-lis-mā'se-ē), the water-plantain family, a natural order of endogenous plants, the members of which are herbaceous, annual or perennial; with petiolate leaves sheathing at the base, hermaphrodite (rarely unisexual) flowers, disposed in spikes, panicles, or racemes. They are floating or marsh plants, and many have edible fleshy rhizomes. They are found in all countries, but especially in Europe and North America, where their rather brilliant flowers adorn the pools and streams. The principal genera are *Alisma* (water-plaintain) and *Sagittaria* (arrow-head).

Alison (al'i-sun), ARCHIBALD, a theologian and writer on esthetics, born at Edinburgh in 1757; died there in 1839. He studied in Glasgow and at Balliol College, Oxford, entered the English Church, and finally (1800) settled as the minister of an Episcopal chapel at Edinburgh. He published two volumes of sermons, and a work entitled *Essays on the Nature and Principles of Taste* (1790), in which he maintains that all the beauty of material objects depends upon the associations connected with them.

Al'ison, SIR ARCHIBALD, lawyer and writer of history, son of the above, was born in Shropshire in 1792, and died in 1867, near Glasgow. He was educated at the University of Edinburgh, and in 1814 was admitted to the Scottish bar. He spent the next eight years in continental travel. On his return he was appointed advocate-depute, which post he held till 1830. In 1832 he published *Principles of the Criminal Law of Scotland*, and in 1833 *The Practice of the Criminal Law*. He was appointed sheriff of Lanarkshire in 1834, and retained this post till his death. He was made a baronet in 1852. His chief work—*The History of Europe, from 1789 to 1815*—was first issued in ten vols., 1833–42, the narrative being subsequently brought down to 1852, the beginning of the second French Empire. This work displays industry and research, and is generally accurate, but not very readable. Its popularity, however, has been immense, and it has been translated into French, German, Arabic, Hindustani, etc. Among Sir Archibald's other productions are *Principles of Population; Free Trade and Protection; England in 1815 and 1845; Life of the Duke of Marlborough*, etc.

His son, LIEUT.-GENERAL SIR ARCHIBALD ALISON, born in 1826, entered the army in 1846, and served in the Crimea, in India during the mutiny, and in the Ashantee expedition of 1873–4. In Egypt, in 1882, he led the Highland Brigade at the battle of Tel-el-Kebir, and afterwards was left in command of the British army of occupation, returning home with honors in 1883. Died in 1907.

Aliwal (äl-e-wäl'), a village of Hindustan in the Punjab, on the left bank of the Sutlej, celebrated from the battle fought in its vicinity, January 28, 1846, between the Sikhs and a British army commanded by Sir Harry Smith, resulting in the total defeat of the Sikhs.

Alizarine (a-liz'a-rin), a substance contained in the madder root, and largely used in dyeing reds of various shades. Formerly madder root was largely employed as a dye-stuff, its capability of dyeing being chiefly due to the presence in it of alizarine; but the use of the root has been almost superseded by the employment of alizarine itself, prepared artificially from one of the constituents of coal-tar. It forms yellowish-red prismatic crystals, nearly insoluble in cold, but dissolved to a small extent by boiling water, and readily soluble in alcohol and ether. It possesses exceedingly strong tinctorial powers.

Alkahest (al'ka-hest), the pretended universal solvent or menstruum of the alchemists.

Alkali (from Ar. *al-qaliy*, the ashes of the plant from which soda was first obtained, or the plant itself), a term first used to designate the soluble part of the ashes of plants, especially of sea-weed. Now the term is applied to various classes of chemical bodies having the following properties in common:—(1) solubility in water; (2) the power of neutralizing acids, and forming salts with them; (3) the property of corroding animal and vegetable substances; (4) the property of altering the tint of many coloring matters —thus, they turn litmus, reddened by an acid, into blue; turmeric, brown; and syrup of violets and infusion of red cabbages, green. The alkalies are hydroxides, or water in which half the hydrogen is replaced by a metal or compound radical. In its restricted and common sense the term is applied to six substances only: the hydroxides of potassium, sodium, lithium, cæsium, rubidium and ammonium. In a more general sense it is applied to the hydroxides of the metals of the alkaline earths, barium, strontium, calcium and magnesium, and to a large number of organic substances, both natural and artificial, described under *Alkaloid.—Volatile alkali* is a name given to ammonia, because of its volatility. *Fixed alkalies* are the non-volatile, stable kind.

Alkali Lands, the name given to certain regions of Montana, Utah and New Mexico, which are marked by the presence of alkali either under ground or crusted on the surface.

Alkalimeter (al-ka-lim'e-tėr), an instrument for ascertaining the quantity of free alkali in any impure specimen, as in the potashes of commerce. These, besides the carbonate of potash, of which they principally consist, usually contain a portion of foreign salts, as sulphate and chloride of potassium, and as the true worth of the substance, or price for which it ought to sell, depends entirely on the quantity of carbonate, it is of importance to be able to measure it accurately by some easy process. An instrument devised for the quantitative analysis of carbonated alkali consists essentially of a thin glass vessel which can be weighed on a delicate balance and is so constructed that a known weight of sodium carbonate or acid carbonate is kept from acid contained in another division during the first weighing. The acid is then run onto the carbonate, causing evolution of carbon-dioxide gas, which passes out of the apparatus through concentrated sulphuric acid or over calcium chloride. The apparatus is then weighed a second time. The loss in weight represents the carbon dioxide evolved and indicates the quality of the carbonate. A process of neutralization, exactly the same in principle, may be employed to test the strength of acids by alkalies, the one process being called *alkalimetry*, the other *acidimetry*.

Alkaloid, a term applied to a class of nitrogenized compounds having certain alkaline properties, found in living plants, and containing their active principles. Their names generally end in *ine*, as *morphine*, *quinine*, *aconitine*, *caffeine*, etc. Most alkaloids occur in plants, but some are formed by decomposition. Their alkaline character depends on the nitrogen they contain. Most natural alkaloids contain carbon, hydrogen, nitrogen, and oxygen, but the greater number of artificial ones want the oxygen. The only property common to all alkaloids is that of combining with acids to form salts, and some exhibit an alkaline reaction with colors. Alkaloids form what is termed the *organic bases* of plants. Although formed originally within the plant, it has been found possible to prepare several of these alkaloids by purely artificial means.

Alkanet, a dyeing drug, the bark of the root of the *Anchūsa* or *Alkanna tinctoria*, a plant of the order *Boraginaceæ*, with downy and spear-shaped leaves, and clusters of small purple or reddish flowers. The plant is sometimes cultivated in Britain, but most of the alkanet of commerce is imported from the Levant or from southern France. It imparts a fine deep-red color to all unctuous substances and is used for coloring oils, plasters, lip-salve, confections, etc.; also in compositions for rubbing and giving color to mahogany furniture, and to color spurious port-wine.

Alkanna, a name of henna. See also *Alkanet*.

Alkarsin, an extremely poisonous liquid containing kakodyle, together with oxidation products of this substance, and formerly known as *Cadet's fuming liquor*, characterized by its poisonous, irritating odor and high degree of spontaneous combustibility when exposed to air.

Alkmaar (ålk'mär), a town of the Netherlands, prov. of North Holland, on the North Holland Canal, and 20 miles N. N. W. of Amsterdam, regularly built, with a fine church (St. Lawrence) and a richly decorated Gothic town-house; manufactures of salt, sail-cloth, vinegar, leather, etc., and an extensive trade in cattle, corn, butter, and cheese. Pop. 23,755.

Alkoran. See *Koran*.

Alla breve (brā'vā), a musical direction expressing that a breve is to be played as fast as a semibreve, a semibreve as fast as a minim, and so on.

Allah (al'a), in Arabic, the name of God, a word of kindred origin with the Hebrew word *Elohim*. *Allah Akbar* (God is great) is a Mohammedan war-cry.

Allahabad (äl-lä-hä-bäd'; 'city of Allah'), an ancient city of India, capital of the Northwest Provinces, on the wedge of land formed by the Jumna and the Ganges, largely built of mud houses, though the English quarter has more of a European aspect. Among the remarkable buildings are the fort, and the mausoleum and garden of Khosru, the tomb being a handsome domed building. Allahabad is one of the chief resorts of Hindu pilgrims, and is also the scene of a great fair in December and January. There are no manufactures of importance, but a large general and transit trade is carried on. The town is as old as the third century B.C. In the mutiny of 1857 it was the scene of a serious outbreak and massacre. Population 175,748. —The division of ALLAHABAD contains the districts of Cawnpur, Futtehpur, Hamirpur, Banda, Jhansi, and Allahabad; area, 17,270 square miles; pop. 5,540,702.

Allamanda (al-a-man'da), a genus of American tropical plants, order Apocynaceæ, with large yellow or violet flowers, some of them met with in European green houses. *A. Cathartica* has strong emetic and purgative properties.

Allan (al'lan), DAVID, a Scottish painter, born 1744; died 1796. He studied in Foulis's academy of painting and engraving in Glasgow, and for sixteen years in Italy, finally establishing himself at Edinburgh, where he succeeded Runciman as master of the Trustees' Academy. His illustrations of the *Gentle Shepherd*, the *Cotter's Saturday Night*, etc., obtained for him the name of the 'Scottish Hogarth.'

Allan, GEORGE WILLIAM, a Canadian statesman, born at York, later Toronto, in 1846. He was speaker of the Dominion Senate, 1888-91; was later Chancellor of Trinity University, Toronto; and a member of the King's Privy Council of Canada.

Allan, SIR WILLIAM, a distinguished Scottish artist, born in 1782; died in 1850. He was a fellow-student with Wilkie in Edinburgh, afterwards a student of the Royal Academy, London; then went to St. Petersburg, and remained for ten years in the Russian dominions. In 1814 he returned to Scotland, and publicly exhibited his pictures, one of which (*Circassian Captives*) made his reputation. He now turned his attention to historical painting, and produced, *Knox admonishing Mary Queen of Scots*, *Murder of Rizzio*, *Exiles on their Way to Siberia*, *The Slave Market at Constantinople*, etc.; latterly also battle scenes, as the *Battle of Prestonpans*, *Nelson Boarding the San Nicolas*, and two pictures of the *Battle of Waterloo*, the one from the British, the other from the French position, and delineating the actual scene and the incidents therein taking place at the moment chosen for the representation. One of these Waterloo pictures was purchased by the Duke of Wellington. He traveled extensively, visiting Italy, Greece, Asia Minor, Spain, and Barbary. In 1835 he became R. A., in 1838 president of the Scottish Academy, in 1842 he was knighted.

Allantois (a-lan'tō-is), a structure appearing during the early development of vertebrate animals—reptiles, birds, and mammalia. It is largely made up of blood-vessels, and, especially in birds, attains a large size. It forms the inner lining to the shell, and may thus be viewed as the surface by means of which the respiration of the embryo is carried on. In mammalia the allantois is not so largely developed as in birds, and it enters into the formation of the placenta, the organ by which the embryos both feed and breathe. In man the allantois becomes a ligamentous fragment.

Alleghany (al-le-gā'ni), a river of Pennsylvania and New York, which unites with the Monongahela at Pittsburgh to form the Ohio; navigable nearly 200 miles above Pittsburgh.

Alleghany Mountains, a name sometimes used as synonymous with Appalachians, but also often restricted to the portion of those mountains that traverses the States of Virginia, Maryland, and Pennsylvania from southwest to the northeast, and consists of a series of parallel ridges for the most part wooded to the summit, and with some fertile valleys between. Their mean elevation is about 2500 feet; but in Virginia they rise to over 4000.

Allegheny (al-le-gen'i), or Allegheny City, a former city of Pennsylvania, on the river Alleghany, opposite Pittsburgh, with which it was united by act of the State Legislature in 1906. The principal industries of the twin cities are those connected with iron and machinery. Pop. 145,240.

Allegiance (a-lē′jans; from L. *alligare*, to bind), according to Blackstone, is the tie or *ligament* which binds the subject to the sovereign in return for that protection which the sovereign affords the subject, or, generally, the obedience which every subject or citizen owes to the government of his country. It used to be the doctrine of the English law that natural-born subjects owe an allegiance which is intrinsic and perpetual, and which cannot be divested by any act of their own; but this is no longer the case. Aliens owe a temporary or local allegiance to the government under which they for the time reside. A usurper in undisturbed possession of the crown is entitled to allegiance; and thus treasons against Henry VI were punished in the reign of Edward IV though the former had, by act of Parliament, been declared a usurper.

Allegory (al′e-go-ri), a figurative representation in which the signs (words or forms) signify something besides their literal or direct meaning. In rhetoric allegory is often but a continued simile. Parables and fables are a species of allegory. Sometimes long works are throughout allegorical, as Spenser's *Faerie Queen* and Bunyan's *Pilgrim's Progress*. When an allegory is thus continued it is indispensable to its success that not only the allegorical meaning should be appropriate, but that the story should have an interest of its own in the direct meaning apart from the allegorical signification. Allegory is often made use of in painting and sculpture as well as in literature.

Allegri (äl-lā′grē), Gregorio, an Italian composer, born at Rome about 1580, died there about 1650; celebrated for his *miserere* music to the fifty-seventh psalm, which in the Latin version begins with that word.

Allegro (Italian äl-lā′grō), a musical term expressing a more or less quick rate of movement, or a piece of music or movement in lively time. *Allegro moderato*, moderately quick; *allegro maestoso*, quick but with dignity; *allegro assai* and *allegro molto*, very quick; *allegro con brio* or *con fuoco*, with fire and energy; *allegrissimo*, with the utmost rapidity.

Alleine (al′en), Joseph, English Noncomformist divine; born 1633; died 1668; the author of a popular religious book entitled, *An Alarm to Unconverted Sinners*.

Alleine (al′en), Richard, English Noncomformist divine; born in 1611, died 1681; rector for twenty years of Batcombe (Somerset); deprived of his living at the Restoration, and imprisoned for preaching. He wrote, among other things, *Vindiciæ Pietatis*, or a *Vindication of Godliness*, which was condemned to be burned in the royal kitchen.

Alleluia. See *Halleluia*.

Allemande (ål-mānd), a kind of slow, graceful dance, invented in France in the time of Louis XIV, and again in vogue in the time of the First Empire.

Allen (al′len), Bog of, the name applied to a series of bogs in Ireland (not to one continuous morass), dispersed, often widely apart, with extensive tracts of dry cultivated soil between, over a broad belt of land stretching across the center of the country, the bogs being, however, all on the east side of the Shannon.

Allen, Ethan, an American Revolutionary partisan and general: born 1737, died 1789. He surprised and captured Fort Ticonderoga (1775); attacked Montreal, and was captured and sent to England, being exchanged in 1778.—His younger brother, Ira, was also prominent in the Revolutionary era.

Allen, Grant, naturalist and novelist, born in Kingston, Canada, in 1848. Was professor of logic and philosophy in Queen's College, Spanish Town, Jamaica, in 1873; principal 1874–77. Wrote *Anglo-Saxon Britain* and a number of works illustrating the principle of evolution in simple and attractive language. In 1884 he became a novelist, writing *Philistia*, *An African Millionaire*, etc. Died in 1899.

Allen, James Lane, novelist, born near Lexington, Kentucky, in 1849; graduated at Transylvania University; became professor of Latin and Higher English at Bethany College, W. Va.; after 1886 engaged in literature. His first story, *John Gray*, afterward extended and republished as *The Choir Invisible*, gave him a high reputation from its depth of thought and insight. Other works are *The Blue Grass Region of Kentucky; With Flute and Violin; Aftermath; A Kentucky Cardinal; A Summer in Arcady*, etc.

Allen, Joel Asaph, zoölogist, born at Springfield, Massachusetts, in 1838; member of the National Academy of Sciences after 1876; first president American Ornithologists' Union; curator of Mammalogy and Ornithology at American Museum of Natural History after 1885. Author of *History of North American Pinnipeds; Monographs of North American Rodentia, etc.*

Allen, JOHN, a Scotch political and historical writer; born in 1771, died in 1843. He studied medicine, and became M. D. of Edinburgh University. In 1801 he went abroad with Lord Holland and family, and henceforth he maintained this connection, being long an inmate of Holland House (London) and a member of the brilliant society there.

Allen, THOMAS, an English mathematician, philosopher, antiquarian, and astrologer, born in 1542, died in 1632. He studied at Oxford, and lived the greater part of his life in learned retirement, corresponding with many of the famous men of his time. In his own day he was generally reputed a dealer in the black art.

Allen, WILLIAM, Cardinal, an English Roman Catholic of the time of Queen Elizabeth, a strenuous opponent of Protestantism and supporter of the claims of Philip II to the English throne; born 1532, died 1594. It was by his efforts that the English college for Catholics at Douay was established. He was made cardinal in 1587. His writings were numerous.

Allen, WILLIAM, an American clergyman and author; born in 1784; died 1868. He was president of Bowdoin College 1820-1839; author of *American Biographical and Historical Dictionary*, a *Supplement to Webster's Dictionary*, *Poems*, etc.

Allenby, Major-General Sir EDMUND HENRY HYNMAN, K. C. B., British soldier, famous as the conqueror of Jerusalem. He was born in 1861 and was educated at Haileybury. He entered the Enniskillen Dragoons and served with that force in the Bechuanaland expedition in 1884-1885, and in Zululand 1888. He was adjutant in the Enniskillen Dragoons from 1889 to 1893 and was twice mentioned in dispatches during the Boer war (1899-1902). He commanded the Fifth Royal Irish Lancers from 1902 to 1905; and the Fourth Cavalry Brigade to 1910. He served in the European war, was mentioned in dispatches and created K. C. B. in 1915 and was given the dignity of Officer of the Legion of Honor. His crowning exploit was the capture of Jerusalem after a brilliant campaign, which began with the investment and capture of the city of Beersheba, near the southern border of Palestine, on October 31, 1917. He led his victorious troops into the sacred city on December 11, 1917.

Allenstein (äl'len-stīn), a town in East Prussia, 65 miles south of Königsberg, on the Alle, with breweries and manufactures of iron and lucifer matches. Pop. 24,207.

Allentown (al'len-toun), a city, county seat of Lehigh county, Pennsylvania, 50 miles N. W. of Philadelphia, on the Lehigh River. It is an important manufacturing city, its products including furniture, silk, cement, shoes, bricks, wire, motor trucks, fire engines, hosiery, etc. It is the seat of Muhlenberg College (Lutheran; established 1867) and Allentown College for Women. Pop. (1910) 51,913; (1920) 73,502.

Alleyn (al'len), EDWARD (1566-1626), an English actor and theater proprietor, friend of Jonson and Shakespeare. He built Dulwich College (q. v.) in 1613-17, under the name of 'The College of God's Gift.'

All-fours, a game at cards, which derives its name from the four chances of which it consists, for each of which a point is scored.

All-hallows, All-hallowmas, a name for All Saints' Day.

Allia (now aja or aia), a small affluent of the Tiber, joining it about 12 miles from Rome, famous for the defeat sustained by the Roman army from Brennus and his Gauls, resulting in the capture and sack of Rome, about 390 B. C.

Alliaceous (al-i-ā'shus) PLANTS, vegetables belonging to the genus *Allium* (order Liliaceæ), that to which the onion, leek, garlic, shallot, etc., belong, or to other allied genera, and distinguished by a certain peculiar pungent smell and taste characterized as *alliaceous*. This flavor is also found in a few plants having no botanical affinities with the above, as in the *Alliaria officinālis*, or jack-by-the-hedge, a plant of the order Cruciferæ.

Alliance (a-lī'ans), a league between two or more powers. Alliances are divided into offensive and defensive. The former are for the purpose of attacking a common enemy, and the latter for mutual defense. An alliance often unites both of these conditions. See *Holy Alliance*, *League of Nations*, etc.

Alliance, a city of Stark county, Ohio, 50 miles S. E. of Cleveland, on the Mahoning River, in a rich farming district. It has manufactures of heavy machinery, electric cranes, structural iron, railroad equipment, electric furnaces, tank cars, storage tanks, auto parts, drills, jacks, paving and building brick, etc. Home of Mt. Union College. Pop. (1910) 15,083; (1920) 21,603.

Allibone (al'i-bōn), SAMUEL AUSTIN, an author and compiler, born at Philadelphia in 1816; died in 1889. He is best known by his notable

work, *A Critical Dictionary of English Literature and British and American Authors.*

Allice, a name of the common shad.

Allier (ål-lē-ā), a central department of France, intersected by the river Allier, and partly bounded by the Loire; surface diversified by offsets of the Cevennes and other ranges, rising in the south to over 4000 feet, and in general richly wooded. It has extensive beds of coal as well as other minerals, which are actively worked, there being several flourishing centers of mining and manufacturing enterprise; mineral waters at Vichy, Bourbon, L'Archambault, etc. Large numbers of sheep and cattle are bred. Area 2848 miles. Capital, Moulins. Pop. 422,024. The river Allier flows northward for 200 miles through Lozère, Upper Loire, Puy de Dôme, and Allier, and enters the Loire.

Allies, The, a name given to the combination of nations which fought against the German-Austrian-Turkish-Bulgarian coalition in the European war. These at first comprised England, France and Russia, among whom had existed a Triple Entente. Italy later joined the Allies in warring against the Central Powers, as did a number of other nations, including the United States.

Alligation (al-i-gā'shun), a rule of arithmetic, chiefly found in the older books, relating to the solution of questions concerning the compounding or mixing together of different ingredients, or ingredients of different qualities or values. Thus if a quantity of sugar worth 8*c* the lb. and another quantity worth 10*c* are mixed the question to be solved by alligation is, what is the value of the mixture by the pound.

Alligator (al'i-gā-tur) (a corruption of Sp. *el lagarto*, lit. the lizard—L. *lacertus*), a genus of reptiles of the family Crocodilidæ, differing from the true crocodiles in having a shorter and flatter head, in having cavities or pits in the upper jaw, into which the long canine teeth of the under jaw fit, and in having the feet much less webbed. They are confined to the warmer parts of America, where they frequent swamps and marshes, and may be seen basking on the dry ground during the day in the heat of the sun. They are most active during the night, when they make a loud bellowing. The largest of these animals grow to the length of 18 or 20 feet. They are covered by a dense armor of horny scales, impenetrable by a rifle-ball, and have a huge mouth, armed with strong, conical teeth. They swim with wonderful celerity, impelled by their long, laterally-compressed, and powerful tails. On land, their motions are proportionally slow and embarrassed because of the length and unwieldiness of their bodies and the shortness of their limbs. They live on fish, and any small animals or carrion, and sometimes catch pigs on the shore or dogs which are swimming. They even sometimes make man their prey. In winter they burrow in the mud of swamps and marshes, lying torpid till the warm weather. The female lays a great number of eggs, which are deposited in the sand or mud, and left to be hatched by the heat of the sun, but the mother alligator is very attentive to her young. The most fierce and dangerous species is that found in the southern parts of the United States (*Alligator Lucius*), having the snout a little turned up, slightly resembling that of the pike. The alligators of South America are there very often called *Caymans*. *A. sclerops* is known also as the *Spectacled Cayman*, from the prominent bony rim surrounding the orbit of each eye. The flesh of the alligator is sometimes eaten. Among the fossils of the south of England are remains of a true alligator (*A. Hantoniensis*) in the Eocene beds of the Hampshire basin.

Alligator-apple (*Anōna palustris*), a fruit allied to the custard-apple, growing in marshy districts in the West Indies, inedible by man, but greedily devoured by alligators.

Alligator-pear (*Persēa gratissima*), an evergreen tree of the natural order Lauraceæ, with a fruit resembling a large pear, 1 to 2 lbs. in weight, with a firm, marrow-like pulp of a delicate flavor; called also avocado-pear, or subaltern's butter. It is a native of tropical America.

Allingham (al'ling-ham), William, an English poet, born in Ireland in 1824; died 1889. He was a frequent contributor to periodicals, and for some time edited *Fraser's Magazine.*

Allison (al'i-son), William B., born in Perry, Ohio, in 1829; died 1908. He served in Congress as Representative and after 1873 as Senator from Iowa, and was a member of the Monetary Congress at Brussels in 1892.

Alliteration (a-lit-er-ā'shun), the repetition of the same letter at the beginning of two or more words immediately succeeding each other, or at short intervals; as '*m*any *m*en *m*any *m*inds'; '*d*eath *d*efies the *d*octor.' '*A*pt *a*lliteration's *a*rtful *a*id' *Churchhill.* '*P*uffs, *p*owders, *p*atches, *b*ibles, *b*illet-doux' *Pope.* In the ancient Ger-

man and Scandinavian and in early English poetry alliteration took the place of terminal rhymes, the alliterative syllables being made to recur with a certain regularity in the same position in successive verses. In the *Vision of William Concerning Piers the Ploughman*, for instance, it is regularly employed as in the following lines:—

Hire robe was ful riche of red scarlet engreyned,
With ribanes of red gold and of riche stones;
Hire arraye me ravysshed such ricchesse saw I nevere;
I had wondre what she was and whas wyf she were.

In the hands of some English poets and prose writers of later times alliteration became a mere conceit. It is still employed in Icelandic poetry, and also in Finnish poetry. So far has alliteration sometimes been carried that long compositions have been written every word of which commenced with the same letter.

Allium (al'li-um), a genus of plants, order Liliaceæ, containing numerous well-known species of pot-herbs. They are umbelliferous, and mostly perennial, herbaceous plants, but a few are biennial. Among them are garlic (*A. satīvum*), onion (*A. Cepa*), leek (*A. Porrum*), chive (*A. Schœnoprasum*), shallot (*A. ascalonicum*). The peculiar alliaceous flavor that belongs to them is well known.

Alloa (al'lo-a), a river port of Scotland, on the north bank of the Forth (where there is now a bridge), 6 miles from Stirling, county of Clackmannan. It carries on brewing, distilling, and shipbuilding; has manufactures of woolens, bottles, etc., and a considerable shipping trade. Pop. 14,458.

Allocution (al-ō-kū'shun), an address, a term particularly applied to certain addresses on important occasions made by the pope to the cardinals.

Allodium (a-lō'di-um), land held in one's own right, without any feudal obligation to a superior or lord. In England, according to the theory of the British constitution, all land is held of the crown (by *feudal* tenure); the word *allodial* is, therefore, never applied to landed property there.

Allopathy (al-op'a-thi), the name applied by homœopathists to systems of medicine other than their own; Hahnemann's principle, promulgated by Hippocrates centuries before, being that 'like cures like,' he called his own system *homœopathy* (Greek, *homoios*, like; *pathos*, disease) and other systems *allopathy* (Greek, *allos*, other, and *pathos*, disease). See *Homœopathy*.

Allotropy (a-lot'rō-pi; Greek *allos*, other, *tropos*, habit), a term used to express the fact that one and the same element may exist in different forms, differing widely in external physical properties. Thus, carbon occurs as the diamond, and as charcoal and plumbago, and is therefore regarded as a substance subject to allotropy.

Alloway (al'lo-wā), a parish of Scotland, now included in Ayr parish. Here Burns was born in 1759, and the 'auld haunted kirk,' near his birthplace, was the scene of the dance of witches in *Tam o'Shanter*.

Alloy (a-loi'), a substance produced by melting together two or more metals, excepting mercury, or quicksilver (see *Amalgam*), sometimes a definite chemical compound, but more generally merely a mechanical mixture. Most metals mix together in all proportions, but others unite only in definite proportions, and form true chemical compounds. Others again resist combination, and when fused together form not a homogeneous mixture, but a conglomerate of distinct masses. The changes produced in their physical properties by the combination of metals are very various. Their hardness is in general increased, their malleability and ductility impaired. The color of an alloy may be scarcely different from that of one of its components or it may show traces of neither of two. Its specific gravity is sometimes less than the mean of that of its component metals. Alloys are always more fusible than the metal most difficult to melt that enters into their composition, and generally even more so than the most easily melted one. Newton's fusible metal, composed of three parts of tin, two or five parts of lead, and five or eight parts of bismuth, melts at temperatures varying from 198° to 210° F. (and therefore in boiling water); its components fuse respectively at the temperatures 442°, 600°, and 478° F. Sometimes each metal retains its own fusing point. Among the important alloys are: *Brass*, an alloy of copper and zinc, varying in proportions in the several varieties of brass; for brass wire the composition usually is 5 parts copper to 3 parts zinc; for red brass, 4 parts copper to 1 part zinc; for yellow brass, 2 parts copper to 1 part zinc; Muntz metal, 3 parts copper to 2 parts zinc; spelter solder, equal parts copper and zinc. *Bronze*, an alloy of copper and tin, to which lead, zinc, aluminum, and even silver are sometimes added according to its uses. The proportions of copper to tin vary from 5 to 1 to 24 to 1; aluminum bronzes carry from

9 to 11 per cent of aluminum; manganese bronze, which is a form of brass, has a small percentage of manganese; titanium added to aluminum bronze gives a bronze so hard as to be practically unworkable. *German silver*, an alloy of nickel, copper and zinc in various proportions, usually 4 parts copper, and 2 parts each of nickel and zinc. *Babbitt metal*, an alloy of copper (4 parts), tin (24 to 96 parts), antimony (4 parts). *Britannia metal*, an alloy of tin (90 parts), antimony (8 parts), and copper (2 parts), to which zinc is sometimes added. *Type metal*, an alloy of lead (4 parts) and antimony (1 part). *Solders* are mixtures of tin and lead, or of brass, copper, zinc, etc. *Gold coin* is an alloy of gold (900 parts), copper (75 parts), and silver (25 parts). For *Alloy Steel* see next article.

Alloy Steel, a steel that contains one or more elements other than carbon in sufficient proportion to modify or improve substantially and positively some of its useful properties. There is no definite point where the distinction can be made between an alloy and a simple carbon steel since the effect produced by the alloying element manifestly increases with the percentage added. It is considered, however, that the steel can be classed an alloy steel only when the proportion of added element, or elements, is sufficient to notably modify some of those properties which render the steel commercially important. The development of alloy steels is the result of a demand for steels which would possess greater strength, hardness, ductility, or toughness, etc., than the ordinary carbon steels for a given weight; and in turn it is to the discovery and use of alloy steels that the perfection of modern machines, tools and utensils is largely due. The wide range of formulas available to the manufacturer enables him to select materials which possess the requisite toughness or hardness without excess weight, as evidenced by the strength, lightness and wear resisting qualities of the modern automobile.

Alloy steels are made by either the Open Hearth, Crucible, or Electric Furnace process, and as a rule present no difficulties to the manufacturer on account of the added alloying elements, other than since alloy steels are always of the highest grade, great care and skill must be exercised in the removal of impurities and the prevention of defects. It is customary to add the alloying element in the shape of a ferro-alloy containing a high percentage of this element to the molten steel a short time before the furnace is tapped. Occasionally, with elements which are not subject to loss through oxidation these are added pure and allowed to melt with the charge in the furnace. The subsequent treatment of some of the alloy steels, however, is not so simple. Nickel steel may be heated, rolled and forged into shape without great difficulty, but these operations are performed upon manganese, tungsten and other steels only after great difficulty and experience. In order to obtain full benefit from the addition of the alloying element, alloy steels must be given proper and careful heat treatment, otherwise the development of those properties which make alloy steels superior to simple carbon steels will not be secured to the fullest extent.

The chief elements which ordinarily are used as alloying elements, either singly or in combination, are: nickel, chromium, vanadium, manganese, cobalt, tungsten, and molybdenum; other elements such as copper, uranium, cerium, etc., are used in small quantities in certain special cases. These elements are used either singly or in combination, generally the latter and in standard proportions. The number of combinations on the market is legion, each manufacturer claiming especial advantages for his particular brands of steels. The first three elements, nickel, chromium and vanadium, are the most important, and by far the greatest tonnage of alloy steels produced contain these elements in varying proportions. The essential characteristics of the various kinds of alloy steels are briefly as follows:

Nickel Steels, said to have been used for the first time in 1888, are the most important of all alloy steels and the most abundantly used. The nickel content of useful nickel steel varies from 2% to 46%, which is a wider range than that covered by any other element. The essential feature imparted to ordinary carbon steel by addition of nickel is increased tensile strength, which may run as high as 50%, and increased toughness with only slight decrease in ductility. The great bulk of nickel steel, containing from 2% to 4% nickel, is used for structural purposes, such as bridges, for gun forgings, machine parts, marine shafting, steel rolls and parts of automobiles. Such steel is also more resistant to rusting and abrasion than plain carbon steel. Increase of nickel content up to 13% progressively hardens the steel so that 13% nickel steel is so hard that it can neither be drilled nor machined. Nickel steel with 22% nickel is used where resistance to rusting is a prime consideration, it is also used for the spark poles in spark

plugs for internal combustion engines; 24% to 32% nickel steel is used for electrical resistance, such as is used in irons, toasters, and other household heaters; 30% nickel steel, known under the trade name of *Invar*, is peculiar for its extremely low coefficient of expansion, on this account it is used for scientific instruments, clock pendulums, steel tape measures for accurate surveying work, etc. Finally 46% nickel steel is known as *Platinite*, since it has about the same coefficient of expansion as platinum and glass. It is used for the manufacture of *armored* or *fireproof* glass, i. e. glass into which a network of nickel steel wire has been rolled. It is also used for electrical connections passing through glass plugs in the base of incandescent electric lights. More recently, however, a 38% nickel steel wire coated with copper has been found to give better results.

Chromium Steels. Chromium is preeminently a hardening agent in steel, combining with the carbon to form a carbide, and is used in percentages from 5% to 20%. Chrome steels are used where great hardness and toughness are desired; on this account they are used for stamp shoes, ore crushing machinery, punches and dies, rolls for cold rolling metals, and for files. The most important use of chrome steel is for balls and rolls in ball and roller bearings. Steel containing 12% to 15% chrome is almost completely rust and corrosion proof and on this account is known as *Stainless Steel;* it is used in high grade cutlery, surgical instruments, etc.

Nickel-chromium Steels. This represents the best alloy in general use for commercial purposes. Nickel-chrome steels appear to have combined in them the beneficial effect of both chromium and nickel, but without the disadvantages that are inherent in the use of either one separately. The usual proportions are about two and a half parts of nickel to one of chrome, although these proportions will frequently vary. Chrome-nickel steels are used very extensively in automobile manufacture, both in the structural parts such as frames and axles, and also for gears and motor parts. Armor plate is a chrome-nickel steel containing three and a half per cent nickel and two per cent chromium. Heavy armor is hardened on the surface by a carbonizing process which gives great hardness to the surface while leaving the back of the plate very tough, and hence able to withstand the impact of the projectile. In addition to the armor itself, armor-piercing projectiles are made of a very similar nickel-chrome steel, which however contains a higher percentage of carbon.

Vanadium Steels. Simple vanadium steels are no longer in extensive use, this element being used chiefly in combination with other elements such as chromium and nickel. The use of vanadium in the manufacture of steel is primarily as a deoxidizing agent, which combines with and hence removes the oxygen present in steel, which element gives rise to blowholes and unsound castings. Like most of the alloying elements it tends to give a finer and denser grain structure, raises the tensile strength, and gives greater resistance to shock and repeated stresses. It is seldom used in large proportions, usually from .5% to 2.5%. Its use is chiefly to intensify, through improvement of quality, the effects of other elements, and on this account is added in small proportions to practically all kinds of alloy steels.

Manganese Steels. Originally invented by Sir Robt. Hadfield of England, manganese steel was one of the first alloy steels to come into general use, and showed what improvements could be made in ordinary carbon steel by the addition of other elements. The discovery by Hadfield is an inspiration to every investigator, for it resulted in a material whose properties are not only the opposite of what might be reasonably expected, but whose combination of great hardness and ductility was hitherto unknown. The discovery in addition established beyond question the principle that because a given amount of an element produces a certain effect in steel it by no means follows that a different amount will give the same effect in proportional degree; but on the contrary may give an entirely different, or perhaps contrary, effect, as in the case of manganese. Manganese is present in small proportion in all steels as it is a valuable agent for the removal of oxygen and sulphur. With larger proportion the steel becomes hard and somewhat brittle, which quality increases with increasing manganese up to 4% to 5.5%, when the steel becomes so brittle that it can be powdered with a hammer. As the manganese content is increased still further an entirely new set of properties appear which reach a maximum at 12% to 15%. Manganese steel containing 12% to 13% of this element and over 1% carbon is noted for its extreme toughness, great resistance to wear and abrasion, with difficult machinability. Because of these properties it is used chiefly for jaws and wearing parts of rock-crushing machinery, for railroad frogs and crossings, rails on curves, and for burglar-proof safes where its drill-resisting qualities make it an excellent material.

Silicon Steels. As with manganese

silicon is present in all steels in small proportion and is valuable as a deoxidizing agent. When used as an alloying element the silicon content will run from 2% to 4%. Low silicon steels are used extensively for automobile springs, ring gears, etc.; with high silicon the magnetic properties of the steel are notably affected. Such steels possess high retentivity and coercive force, with high electrical resistance. On this account they are used in the manufacture of electro-magnets, electrical generating machinery, transformer cores, etc.

Molybdenum Steels. The element molybdenum is chemically allied to chromium and in a way imparts similar properties to steel. In proportions of less than 1% it gives great toughness, resistance to shock and fatigue stresses, and easier machinability. Somewhat similar to vanadium, it appears to enhance the effect of other elements such as nickel, chromium, etc. On this account molybdenum steels are used extensively in automobile construction, for connecting rods, crank shafts, gears, etc., and for parts of airplane motors. Molybdenum steels are of particular interest to the United States since about four-fifths of the world's known supply of molybdenum ore is located in Arizona and Colorado.

Self-Hardening Steels. Self-hardening or *Air-Hardening steel* is steel which, because of composition, becomes hard on cooling, without heat treatment, or being subjected to any other process for making it so. Such steels become hard on cooling in air from above a red heat and are capable of cutting other metals. The first steel of this character was invented by Robert Mushet in England and owed its air-hardening properties to both manganese and tungsten. Mushet steel was for many years a famous steel. Owing to its hardness and ability to retain a cutting edge under severe service, tools made of it will perform a large amount of heavy cutting work.

High Speed Steels. Mushet steel has been superseded in recent years by the invention of *High Speed Steel*, the first developments of which are to be credited to F. W. Taylor and Maunsel White of the Bethlehem Steel Works in their attempts to improve the quality of Mushet steel. The result of their experiments was the production of a new kind of steel which has fairly revolutionized the machine-shop industry of the world. Taylor and White found, through the accidental carelessness of a workman, that by applying a new method of heat treatment to self-hardening tool steels, in which the tool was heated to a very high temperature and subsequently cooled in molten lead, the quality was so improved that the tool would cut at such speed that its point might become red hot from the friction developed, yet the tool would not soften. Taylor and White's process was first exhibited at the Paris Exhibition of 1900 and created incredulity and astonishment because of the unheard-of amount of cutting performed by the tool and the unprecedented speed at which it cut. The name 'high speed' steel was not given by Taylor and White to their product, but has since been adopted for all steels of a certain type of composition which are hence capable of retaining a cutting edge under hard service. It was soon found that the composition of self-hardening steel was not the best one for high speed steel. The element tungsten, when present in sufficient proportion, gives the property of retaining hardness at red heat, and after the proper heat treatment had been discovered the high content of manganese was found unnecessary. A high tungsten content with the addition of 3% to 5% chromium gives the best results, so that the composition of the average high speed steel of today is approximately, Carbon .60% to .75%, Tungsten 15% to 20%, Chromium 3% to 5%, Vanadium .5% to 2..5%, with small additions of manganese and silicon. The heat treatment consists in heating to a high temperature (about 2250° F.) then cooling rapidly to atmospheric temperatures and reheating to about 1100° F. to remove brittleness. The alteration in composition has changed the character of the steel so that now high speed steel may be forged or rolled into convenient shapes for tools. cutters, etc., and may also be softened by proper annealing treatment. Molybdenum has been used to replace tungsten in the proportion of one part molybdenum to two parts tungsten, but its use so far cannot be considered successful.

Magnet Steels. The demand for permanent magnets for use in automobile and airplane magnetos and for similar purposes has developed a class of steels which have the greatest retentivity for magnetism. There are two classes of these steels in use, one containing about 6% tungsten, the other, which has the advantage of cheaper cost, contains about 2% chromium. There appears to be little difference in their efficiency.

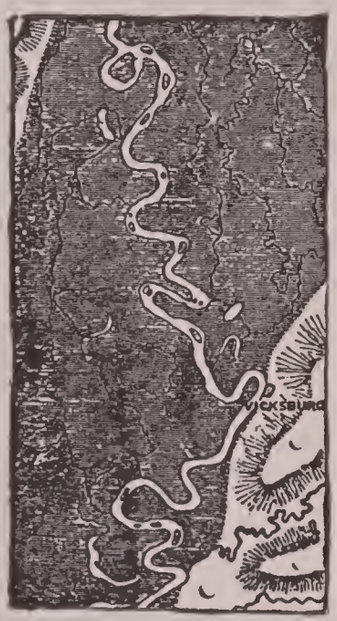
All Saints' Day a festival of the Christian Church, instituted in 835, and celebrated on the 1st of November in honor of the saints in general.

All Souls' Day a festival of the Roman Catholic Church, instituted in 998, and observed

on the 2d of November for the relief of souls in purgatory.

Allspice (al'spīs), or PIMENTA, is the dried berry of a West Indian species of myrtle (*Myrtus Pimenta*), a beautiful tree with white and fragrant aromatic flowers and leaves of a deep shining green. Pimenta is thought to resemble in flavor a mixture of cinnamon, nutmegs, and cloves, whence the popular name of *allspice;* it is also called Jamaica pepper. It is employed in cookery, also in medicine as an agreeable aromatic, and forms the basis of a distilled water, a spirit, and an essential oil.

Allston (al'stun), WASHINGTON, an American painter; born 1779, died 1843. He studied in London and Rome, and is most celebrated for his pictures of Scriptural subjects. He also wrote poems and a novelette (*Monaldi*).



Alluvial plain of the Mississippi.

Alluvium (a-lū'-vi-um; Latin, *alluvium—ad*, to, and *luo*, to wash), deposits of soil collected by the action of water, such as are found in valleys and plains, consisting of loam, clay, gravel, etc., washed down from the higher grounds. Great alterations are often produced by alluvium—deltas and whole islands being often formed by this cause. Much of the rich land along the banks of rivers is alluvial in its origin. The term is specifically applied to those geological formations that are of recent origin, as during the Pleistocene and Recent periods.

Alma (al'ma), a city in the heart of Michigan, midway between Saginaw and Grand Rapids. It has manufactures of motor trucks, etc. Seat of Alma College. Pop. (1920) 7542.

Almacantar (al-ma-kan'tar), a name given to circles of altitude parallel to the horizon, and therefore to an astronomical instrument for determining time and latitude. This consists of a telescope revolving on a horizontal axis, which may be clamped at any altitude, the whole resting on a float in a vessel of mercury. A circle of equal altitude may thus be traced out accurately, and by the transit of stars across this circle time and latitude can be determined.

Almada (äl-mä'dä) a town of Portugal, on the Tagus, opposite Lisbon; has large wine depots. Pop. 7,913.

Almadén (äl-mä-den'), a town of Spain, province of Ciudad-Real, celebrated both in ancient and modern times for its mines of quicksilver (in the form of cinnabar). Pop. about 7375.

Almaden (al'ma-den), a place in California, about 60 m. S.E. of San Francisco, with rich quicksilver mines, the product of which has been largely employed in gold and silver mining.

Almagest (al'ma-jest), the Arabic (semi-Greek) name of a celebrated astronomical work composed by Claudius Ptolemy.

Almagro (äl-mä'grō), an old town of Ciudad-Real, Spain (New Castile), with important lace manufactures. Pop. 7,974.

Alma'gro, DIEGO DE. Spanish 'Conquistador,' a foundling, born about 1475; killed 1538. He took part with Pizarro in the conquest of Peru, and after frequent disputes with Pizarro about their respective shares in their conquests led an expedition against Chile, which he failed to conquer. On his return a struggle took place between him and Pizarro, in which Almagro was finally overcome, taken prisoner, strangled, and afterwards beheaded. He was avenged by his son, who raised an insurrection in which Pizarro was assassinated in 1541. The younger Almagro was put to death in 1542 by De Castro, the new viceroy of Peru.

Almalee (al-ma-lē'), a town of southwestern Asiatic Turkey, 50 miles from Adalia, with thriving manufactures and a considerable trade. Pop. about 12,000.

Al'ma Ma'ter (L., fostering or bounteous mother), a term familiarly applied to their own university by those who have had a university education.

Al-Mamun (ma-mön'), a caliph of the Abasside dynasty, son of Harun-al-Rashid, born 786, died 833. Under him Bagdad became a great center of art and science.

Almanac (al'ma-nak), a calendar, in which are set down the rising and setting of the sun, the phases of the moon, the most remarkable positions and phenomena of the heavenly bodies, for every month and day of the year; also the several fasts and feasts to be observed in the church and state, etc.,

and often much miscellaneous information likely to be useful to the public. The term is of Arabic origin, but the Arabs were not the first to use almanacs, which indeed existed from remote ages. They became generally used in Europe within a short time after the invention of printing; and they were very early remarkable, as some are still, for the mixture of truth and falsehood which they contained. Their effects in France were found so mischievous, from the pretended prophecies which they published, that an edict was promulgated by Henry III in 1579 forbidding any predictions to be inserted in them relating to civil affairs, whether those of the state or of private persons. In the reign of James I of England letters-patent were granted to the two universities and the Stationers' Company for an exclusive right of printing almanacs, but in 1775 this monopoly was abolished. During the civil war of Charles I, and thence onwards, English almanacs were conspicuous for the unblushing boldness of their astrological predictions, and their determined perpetuation of popular errors. The most famous English almanac was *Poor Robin's Almanack*, which was published from 1663 to 1828. Still more famous became *Poor Richard's Almanac*, founded by Benjamin Franklin at Philadelphia in 1732, and notable for its homely maxims. Some of the almanacs that are now annually published are extremely useful to men engaged in official, mercantile, literary, or professional business, such as *Whitaker's Almanac*, of England, and the *Almanach de Gotha*, of Germany, which has appeared since 1764 and contains in small bulk a wonderful quantity of information regarding the reigning families and governments, the finances, commerce, population, etc., of the different states throughout the world. *The Nautical Almanack* is an important work published annually by the British government, two or three years in advance, in which is contained much useful astronomical matter, more especially the distances of the moon from the sun and from certain fixed stars, for every three hours of apparent time, adapted to the meridian of the Royal Observatory, Greenwich. The American *Ephemeris and Nautical Almanac*, a similar work, has been issued annually since 1855 by the Bureau of Navigation of the United States, and France and Germany have publications of the same character.

Almansa (äl-män'sä), a town of southeastern Spain (Murcia), near which was fought (April 25, 1707) a decisive battle in the war of the Spanish succession, when the French, under the Duke of Berwick, defeated the Anglo-Spanish army under the Earl of Galway. Pop. 11,180.

Almanzur, or ALMANSUR (äl-män'sör), caliph of the Abasside dynasty, reigned 754–775. He was cruel and treacherous and a persecutor of the Christians, but a patron of learning.

Alma-Tadema (äl'mä tä'de-mä), LAWRENCE, a Dutch painter, born in 1836, resident since 1870 in England, where he was a naturalized subject. In 1876 he was elected as associate of the Royal Academy, in 1879 an academician; he was also a member of various foreign academies. He is especially celebrated for his pictures of ancient Roman, Greek, and Egyptian life, which are painted with great realism and archæological correctness. Died in 1912.

Al'meh, the name given in Egypt to a class of girls whose profession is to sing for the public amusement, being engaged to perform at feasts and other entertainments (including funerals). Many of them are skillful improvisatrici.

Almeida (äl-mā'i-dä), one of the strongest fortresses in Portugal, in the province of Beira, near the Spanish border, on the Coa. Pop. 2,300. Taken by Masséna from the English in 1810, retaken by Wellington in 1811.

Almeida, D', (dȧl-mā'i-dȧ), FRANCISCO, first Portuguese viceroy of India, son of the Conde de Abrantes, born about the middle of the fifteenth century. He fought with renown against the Moors, and being appointed governor of the new Portuguese settlements on the African and Indian coasts, he sailed for India in 1505, accompanied by his son Lorenzo and other eminent men. In Africa he took possession of Quiloa and Mombas, and in the East he conquered Cananor, Cochin, Calicut, etc., and established forts and factories. His son Lorenzo discovered the Maldives and Madagascar, but perished in an attack made on him by a fleet sent by the Sultan of Egypt, with the aid of the Porte and the Republic of Venice. Having signally defeated the Mussulmans (1508), and avenged his son, and being superseded by Albuquerque, he sailed for Portugal, but was killed in a skirmish on the African coast in 1510.

Almelo (äl-mā-lō'), a town of Holland, prov. Overyssel; with large textile manufactures. Pop. 9957.

Almería (äl-mā-rē'ä), a fortified seaport of southern Spain, capital of prov. Almeria, near the mouth of a river and on the gulf of same name,

with no building of consequence except a Gothic cathedral, but with an important trade, exporting lead, esparto, barilla, etc. The province, which has an area of 3,300 sq. miles, is generally mountainous, and rich in minerals. Pop. of town, 47,326; of province, 359,013.

Almodovar (ål-mo-dō′var), a town of Spain, prov. Ciudad-Real (New Castile), near the Sierra Morena. Pop. 12,535.

Almohades (al′mo-hādz), an Arabic or Moorish dynasty that ruled in Africa and Spain in the twelfth and thirteenth centuries, founded by a religious enthusiast. They overthrew the Almoravides in Spain, but themselves received a defeat in 1212 from which they did not recover, and in 1269 were overthrown in Africa.

Al-mokanna. See MOKANNA.

Almond (å′mund), the fruit of the almond tree (*Amygdalus communis*), a tree which grows usually to the height of 20 feet, and is akin to the peach, nectarine, etc., (order Rosaceæ). It has beautiful pinkish flowers that appear before the leaves, which are oval, pointed, and delicately serrated. It is a native of Africa and Asia, naturalized in Southern Europe, and cultivated in the northern portions of Europe for its beauty. The fruit is a drupe, ovoid, and with downy outer surface; the fleshy covering is tough and fibrous; it covers the compressed wrinkled stone inclosing the seed or almond within it. There are two varieties, one sweet and the other bitter; both are produced from *A. communis*, though from different varieties. The chief kinds of sweet almonds are the Valencian, Jordan, and Malaga. They contain a bland fixed oil, consisting chiefly of olein. Bitter almonds come from Magador, and besides a fixed oil they contain a substance called *emulsin*, and also a bitter, crystalline substance called *amygdalin*, which, acting on the emulsin, produces prussic acid, whence the aroma of bitter almonds when mixed with water. *Almond-oil*, a bland fixed oil, is expressed from the kernels of either sweet or bitter almonds, and is used by perfumers and in medicine. A poisonous essential oil is obtained from bitter almonds, which is used for flavoring by cooks and confectioners, also by perfumers and in medicine. The name *almond*, with a qualifying word prefixed, is also given to the seeds of other species of plants; thus, *Java almonds* are the kernels of *Canarium commune*.

Almond (*Amygdalus communis*).

Almondbury (ä′mund-be,ri), a town of England, West Riding of Yorkshire, included in the borough of Huddersfield, with manufactures of woolen, cotton and silk goods.

Almoner (al′mo-nėr), an officer of a religious establishment to whom belonged the distribution of alms. The grand almoner (*grand aumonier*) of France was the highest ecclesiastical dignitary in that kingdom before the revolution. The lord almoner, or lord high almoner of England, is generally a bishop, whose office is well-nigh a sinecure. He distributes the sovereign's doles to the poor on Maundy Thursday.

Almora (äl-mo′rä) a town and fortress of Hindustan, in the Northwest Provinces, capital of Kumaon, 170 miles E. N. E. from Delhi. Pop. about 8000.

Almoravides (al-mo′ra-vīdz), a Moorish dynasty which arose in northwestern Africa in the eleventh century, and, having crossed the Straits of Gibraltar, gained possession of all Arabic Spain, but was overthrown by the Almohades in the following century.

Al′mug (or AL′GUM) names of trees, which occur in I Ki., x, 11, 12 and II Chr., ii. 8, and ix. 10, 11 to designate trees of which the wood was used for pillars in the temple and the king's house, for harps and psalteries, etc. They are said in one passage to be hewn in Lebanon, in another to be brought from Ophir. They have been identified by critics with the red sandal-wood of India. Some of them may possibly have been transplanted to Lebanon by the Phœnicians.

Almuñecar (ål-mụn-yā′kär), a seaport of Spain, Andalusia, on the Mediterranean. Pop. 8,022.

Al′nager, formerly, in England, an official whose duty it was to inspect, measure, and stamp woolen cloth.

Al′nus. See *Alder.*

Alnwick (an′ik), a town of England, county town of Northumberland, 34 miles N. from Newcastle, near the Aln. It is well built, and carries on tanning, brewing, and a general trade. Alnwick Castle, residence of the Dukes

of Northumberland, for many centuries a fortress of great strength, stands close to the town. Pop. 7041.

Aloe (al'ō), the name of a number of plants belonging to the genus *Aloë* (order Liliaceæ), some of which are not more than a few inches, while others are 30 feet and upwards in height; natives of Africa and other hot regions; leaves fleshy, thick, and more or less spinous at the edges or extremity; flowers with a tubular corolla. Some of the larger kinds are of great use, the fibrous parts of the leaves being made into cordage, fishing nets and lines, cloth, etc. The inspissated juice of several species is used in medicine, under the name of *aloes*, forming a bitter purgative. The principal drug-producing species are the Socotrine aloe (*A. Socotrīna*), the Barbadoes aloe (*A. vulgāris*), the Cape aloe (*A. spicāta*), etc. A beautiful violet color is afforded by the leaves of the Socotrine aloe. The American aloe (see *Agave*) is a different plant altogether; as are also the aloes or lign-aloes of Scripture, which are supposed to be the *Aquilaria Agallŏchum*, or aloes-wood (which see). *Aloe fiber* is obtained from species of *Aloë*, *Agave*, *Yucca*, etc., and is made into coarse fabrics, ropes, etc.

Aloes-wood, Eagle-wood, or Agila-wood, the inner portion of the trunk of *Aquilāria ovāta* and *A. Agallŏchum*, forest trees belonging to the order Aquilariaceæ, found in tropical Asia, and yielding a fragrant resinous substance, which, as well as the wood, is burned for its perfume. Another tree, the Aloexȳlon Agallochum (order Leguminosæ), also produces aloes-wood. This wood is supposed to be the lign-aloes of the Bible.

Alopecia (a-lō-pē'ci-a), a variety of baldness in which the hair falls off from the beard and eyebrows, as well as the scalp.

Alopecurus (a-lō-pē-cū'rus), a genus of grasses. See *Foxtail-grass*.

Alora (ä-lō'rä), a town of Southern Spain, prov. Malaga; pop. 10,525.

Alost, or Aalst (ä'lost, älst), a town of Belgium, 15 miles W. N. W. of Brussels, on the Dender (here navigable), with a beautiful church and an ancient town-hall; manufactures of lace, thread, linen and cotton goods, etc., and a considerable trade. Pop. 31,655.

Alpaca (al-pak'a), a ruminant mammal of the camel tribe, and genus *Auchēnia* (*A. pacos*), a native of the Andes, especially of the mountains of Chile and Peru, and so closely allied to the llama that by some it is regarded rather as a smaller variety than a distinct species. It has been domesticated, and remains also in a wild state. In form and size it approaches the sheep, but has a longer neck. It is valued chiefly for its long, soft, and silky wool, which is straighter than that of the sheep, and very strong, and is woven into fabrics of great beauty, used for shawls, clothing for warm climates, coat-linings, and umbrellas, and known by the same name. Its flesh is pleasant and wholesome.

Alpena (al-pē'na), a city, county seat of Alpena co., Michigan, on Thunder Bay, 125 miles north of Bay City. It has extensive limestone quarries, and is an important manufacturing city and a summer resort. Pop. 11,101.

Alpen-stock (German), a strong tall stick shod with iron, pointed at the end so as to take hold in, and give support on, ice and other dangerous places in climbing the Alps and other high mountains.

Alpes (ălp), the name of three departments in the southeast of France, all more or less covered by the Alps or their offshoots:—Basses-Alpes (bäs-ălp; Lower Alps) has mountains rising to a height of 8,000 to 10,000 feet, is drained by the Durance and its tributaries, and is the most thinly peopled department in France; area, 2,685 miles; capital, Digne, Pop. 113,126. Hautes-Alpes (ōtz-ălp; Upper Alps), mainly formed out of ancient Dauphiné, traversed by the Cottian and Dauphiné Alps (highest summits 12,000 ft.), drained chiefly by the Durance and its tributaries. It is the lowest department in France in point of absolute population; area, 2158 miles; capital, Gap; pop. 107,498.—Alpes-Maritimes (alp-mȧ-ri-tēm; Maritime Alps) has the Mediterranean on the south, and mainly consists of the territory of Nice, ceded to France by Italy in 1860. The greater part of the surface is covered by the Maritime Alps; the principal river is the Var. It produces in the south, cereals, vines, olives, oranges, citrons, and other fruits; and there are manufactories of perfumes, liqueurs, soap, etc., and valuable fisheries. It is a favorite resort for invalids. Area, 1442 square miles; capital, Nice, pop. 334,007.

Alpha and Omega (al'fa, ō-mē'ga, or ō'mi-ga), the first and last letters of the Greek alphabet, sometimes used to signify the beginning and the end, or the first and the last of anything; also as a symbol of the Divine Being. They were also formerly the symbol of Christianity, and engraved

accordingly on the tombs of the ancient Christians.

Alphabet (al'fa-bet; from *Alpha* and *Beta*, the first two letters of the Greek alphabet), the series of characters used in writing a language, and intended to represent the sounds of which it consists. The English alphabet, like most of those of modern Europe, is derived directly from the Latin, the Latin from the ancient Greek, and that from the Phœnician, which again is believed to have had its origin in the Egyptian hieroglyphics, the Hebrew alphabet also having the same origin. The names of the letters in Phœnician and Hebrew must have been almost the same, for the Greek names, which, with the letters, were borrowed from the former, differ little from the Hebrew. By means of the names we may trace the process by which the Egyptian characters were transformed into letters by the Phœnicians. Some Egyptian character would, by its form, recall the idea of a house, for example, in Phœnician or Hebrew *beth*. This character would subsequently come to be used wherever the sound *b* occurred. Its form might be afterwards simplified, or even completely modified, but the name would still remain, as *beth* still continues the Hebrew name for *b*, and *beta* the Greek. Our letter *m*, which in Hebrew was called *mim*, water, has still a considerable resemblance to the zigzag wavy line which had been chosen to represent water, as in the zodiacal symbol for *Aquarius*. The letter *o*, of which the Hebrew name means eye, no doubt originally was intended to represent that organ. While the ancient Greek alphabet gave rise to the ordinary Greek alphabet and the Latin, the Greek alphabet of later times furnished elements for the Coptic, the Gothic, and the old Slavic alphabets. The Latin characters are now employed by a great many nations, such as the Italian, the French, the Spanish, the Portuguese, the English, the Dutch, the German, the Hungarian, the Polish, etc., each nation having introduced such modifications or additions as are necessary to express the sound of the language peculiar to it. The Greek alphabet originally possessed only sixteen letters, though the Phœnician had twenty-two. The original Latin alphabet, as it is found in the oldest inscriptions, consisted of twenty-one letters; namely, the vowels *a*, *e*, *i*, *o*, and *u* (*v*), and the consonants *b*, *c*, *d*, *f*, *h*, *k*, *l*, *m*, *n*, *p*, *q*, *r*, *s*, *t*, *x*, *z*. The Anglo-Saxon alphabet had two characters for the digraph *th*, which were unfortunately not retained in later English; it had also the character *æ*. It wanted *j*, *v*, *y* (consonant), and *z*. The German alphabet consists of the same letters as the English, but the sounds of some of them are different. Anciently certain characters called *Runic* were made use of by the Teutonic nations, to which some would attribute an origin independent of the Greek and Latin alphabets. While the alphabets of the west of Europe are derived from the Latin, the Russian, which is very complete, is based on the Greek, with some characters borrowed from the Armenian, etc. Among Asiatic alphabets, the Arabian (originally of Phœnician origin), has played a part analogous to that of the Latin in Europe, the conquests of Mohammedanism having imposed it on the Persian, the Turkish, the Hindustani, etc. The Sanskrit or Devanāgari alphabet is one of the most remarkable alphabets of the world. As now used it has fourteen characters for the vowels and diphthongs, and thirty-three for the consonants, besides two other symbols. Our alphabet is a very imperfect instrument for what it has to perform, being both defective and redundant. An alphabet is not essential to the writing of a language, since ideograms or symbols may be used instead, as in Chinese. See *Writing*.

Alpheus (al-fē'us), now *Rufia*, the largest river of Peloponnesus, flowing westwards into the Ionian Sea.

Alphonso (al-fon'sō), the name of a number of Portuguese and Spanish kings. Among the former may be mentioned ALPHONSO I, the Conqueror, first King of Portugal, son of Henry of Burgundy, the Conqueror and first Count of Portugal; born 1110, fought successfully against the Spaniards and the Moors, named himself king of Portugal, and was as such recognized by the pope; died 1185.—ALPHONSO V, the African, succeeded his father, Edward I, 1438. Conquered Tangiers; died 1481. During his reign Prince Henry the Navigator continued the important voyages of discovery already begun by the Portuguese. Under him was drawn up an important code of laws.—Among kings of Spain may be mentioned ALPHONSO X, King of Castile and Leon, surnamed the *Astronomer*, the *Philosopher*, or the *Wise;* born in 1226, succeeded in 1252. Being grandson of Philip of Hohenstaufen, son of Frederick Barbarossa, he endeavored to have himself elected Emperor of Germany, and in 1257 succeeded in dividing the election with Richard, Earl of Cornwall. On Richard's death in 1272 he again unsuccessfully contested the imperial crown. Meantime his throne was endangered by conspiracies of the nobles and the attacks of the Moors. The Moors he conquered,

but his domestic troubles were less easily overcome, and he was finally dethroned by his son Sancho, and died two years after, 1284. Alphonso was the most learned prince of his age. Under his direction or superintendence were drawn up a celebrated code of laws, valuable astronomical tables which go under his name (*Alphonsine Tables*), the first general history of Spain in the Castilian tongue, and a Spanish translation of the Bible.—ALPHONSO V, of Aragon I of Naples and Sicily, born in 1385, was the son of Ferdinand I of Aragon, the throne of which he ascended in 1416, ruling also over Sicily and the island of Sardinia. Queen Joanna of Naples had promised to make him her heir, but at her death in 1435 had left her dominions to René of Anjou. Alphonso now proceeded to take possession of Naples by force, which he succeeded in doing in 1442, and reigned till his death in 1458. He was an enlightened patron of literary men, by whom, in the latter part of his reign, his court was thronged.—ALPHONSO XII, King of Spain, the only son of Queen Isabella II and her cousin Francis of Assisi, was born in 1857 and died in 1885. He left Spain with his mother when she was driven from the throne by the revolution of 1868, and till 1874 resided partly in France, partly in Austria. In the latter year he studied for a time at the English military college, Sandhurst, being then known as Prince of the Asturias. His mother had given up her claims to the throne in 1870 in his favor, and in 1874 Alphonso came forward himself as claimant, and in the end of the year was proclaimed by General Martinez Campos as king. He now passed over into Spain and was enthusiastically received, most of the Spaniards being by this time tired of the republican government, which had failed to put down the Carlist party. Alphonso was successful in bringing the Carlist struggle to an end (1876), and thenceforth he reigned with little disturbance. He married first his cousin Maria de las Mercedes; second, Maria Christiana, archduchess of Austria.—ALPHONSO XIII, King of Spain, posthumous son of Alphonso XII. He remained under the regency of his mother, Maria Christiana, until May 17, 1902, when he assumed the duties of the throne. He married in 1906 the English princess Victoria Eugenie, niece of Edward VII.

Alpine Crow, ALPINE CHOUGH (*Pyrrhocŏrax alpīnus*), a European bird closely akin to the chough of England.

Alpine Plants, the name given to those plants whose habitat is in the neighborhood of the snow, on mountains partly covered with it all the year round. As the height of the snow-line varies according to the latitude and local conditions, so also does the height at which these plants grow. The mean height for the alpine plants of Central Europe is about 6000 feet; but it rises in parts of the Alps and in the Pyrenees to 9000, or even more. The high grounds clear of snow among these mountains present a very well marked flora, the general characters of the plants being a low dwarfish habit, a tendency to form thick turfs, stems partly or wholly woody, and large brilliantly-colored and often very sweet-smelling flowers. They are also often closely covered with woolly hairs.

Alpine Tunnels. The fifth tunnel through the Alps, the Loetschberg, in Oberlund, Switzerland, 9¼ miles long, was opened to travel in 1913. Cost nearly $10,000,000.

Alpine Warbler (*Accentor alpīnus*), a European bird of the same genus as the hedge-sparrow.

Alpin'ia, a genus of plants. See *Galangal.*

Alps, the highest and most extensive system of mountains in Europe, included between lat. 44° and 48° N., and lon. 5° and 18° E., occupying much of Northern Italy, several departments of France, nearly the whole of Switzerland, and a large part of Austria, while its extensive ramifications connect it with nearly all the mountain systems of Europe. The culminating peak is Mont Blanc, 15,781 feet high, though the true center is the St. Gothard, or the mountain mass to which it belongs, and from whose slopes flow, either directly or by affluents, the great rivers of Central Europe, the Danube, Rhine, Rhone, and Po. Round the northern frontier of Italy the Alps form a remarkable barrier, shutting it off at all points from the mainland of Europe, so that, as a rule, it can only be approached from France, Germany, or Switzerland, through high and difficult passes. In the west this barrier approaches close to the Mediterranean coast, and near Nice there is left a free passage into the Italian peninsula between the mountains and the sea. From this point eastward the chain proceeds along the coast till it forms a junction with the Apennines. In the opposite direction it proceeds northwest, and afterwards north to Mont Blanc, on the boundaries of France and Italy; it then turns northeast and runs generally in this direction to the Gross Glockner, in Central Tyrol, between the rivers Drave and the Salza.

where it divides into two branches, the northern proceeding northeast towards Vienna, the southern towards the Balkan Peninsula. The principal valleys of the Alps run mainly in a direction nearly parallel with the principal ranges, and therefore east and west. The transverse valleys are commonly shorter, and frequently lead up through a narrow gorge to a depression in the main ridge between two adjacent peaks. These are the passes or *cols*, which may usually be found by tracing a stream which descends from the mountains up to its source.

The Alps in their various great divisions receive different names. The *Maritime Alps*, so called from their proximity to the Mediterranean, extend westward from their junction with the Apennines for a distance of about 100 miles; principal pass, the Col de Tenda (6158 feet), which was made practicable for carriages by Napoleon I. Proceeding northward the next group consists of the *Cottian Alps*, length about 60 miles. Next come the *Graian Alps*, 50 miles long, with extensive ramifications in Savoie and Piedmont. To this group belongs Mont Cenis Pass (6765 feet), over which a carriage road was constructed by Napoleon I, while a railway now passes through the mountain by a tunnel nearly 8 miles long. These three divisions of the Alps are often classed together as the *Western Alps*, while the portion of the system immediately east of this forms the *Central Alps*. The *Pennine Alps* form the loftiest portion of the whole system, having Mont Blanc (in France) at one extremity, and Monte Rosa at the other (60 miles), and including the Alps of Savoy and the Valais. In the east the valley of the upper Rhone separates the Pennine Alps from the great chain of the *Bernese Alps* running nearly parallel, the great peaks of the two ranges being about 20 miles apart. The pass of Great St. Bernard is celebrated for its hospice. The most easterly pass is the Simplon, 6,595 feet, with a carriage road made by Napoleon I. Further east are the *Lepontine Alps*, divided into several groups. From this run northward and southward numerous streams, the latter to the valleys in which lie the lakes Maggiore, Como, etc. The principal pass is the St. Gothard (6,936 feet), over which passes a carriage road to Italy, while through this mountain mass a railway tunnel more than 9 miles long has been opened. Highest peaks: Tödi, 11,887 feet; Monte Leone, 11,696. The *Rhætian Alps*, extending east to about lat. 12° 30′, are the most easterly of the Central Alps, and are divided into two portions by the Engadine, or valley of the Inn, and also broken by the valley of the Adige. The Brenner Pass (4,588 feet), from Verona to Innsbruck, and between the Central and the Eastern Alps, is crossed by a railway. On the railway from Innsbruck to the Lake of Constance is the Arlberg Tunnel, over 6 miles long. The *Eastern Alps* form the broadest and lowest portion of the system, and embrace the *Noric Alps*, the *Carnic Alps*, the *Julian Alps*, etc.; highest peak, the Gross Glockner, 12,405 feet. The height of the southeastern continuations of the Alps rapidly diminishes, and they lose themselves in ranges having nothing in common with the great mountain masses which distinguish the center of the system.

The Alps are very rich in lakes and streams. Among the chief of the former are the lakes of Geneva, Constance, Zürich, Thun, Brienz, on the north side; on the south Maggiore, Como, Lugano, Garda, etc. The drainage is carried to the North Sea by the Rhine, to the Mediterranean by the Rhone, to the Adriatic by the Po, to the Black Sea by the Danube.

In the lower valleys of the Alps the mean temperature ranges from 50° to 60°. Half-way up the Alps it averages about 32°—a height which, in the snowy regions, it never reaches. The exhilarating and invigorating nature of the climate in the upper regions during summer has been acknowledged by all. In spite, however, of the generally salubrious climate, the inhabitants of the higher valleys are often afflicted with such diseases as goitre and cretinism.

In respect to vegetation the Alps have been divided into six zones, depending on height modified by exposure and local circumstances. The first is the olive region. This tree flourishes better on sheltered slopes of the mountains than on the plains of Northern Italy. The vine, which bears greater winter cold, distinguishes the second zone. On slopes exposed to the sun it flourishes to a considerable height. The third is called the mountainous region. Cereals and deciduous trees form the distinguished features of its vegetation. The mean temperature about equals that of Great Britain, but the extremes are greater. The fourth region is the sub-Alpine or coniferous. Here are vast forests of pines of various species. Most of the Alpine villages are in the last two regions. On the northern slopes pines grow to 6,000, and on the southern slopes to 7,000 feet above the level of the sea. This is also the region of the lower or permanent pastures where the flocks are fed in winter. The fifth is the pasture region, the term *alp*

being used in the local sense of high pasture grounds. It extends from the uppermost limit of trees to the region of perpetual snow. Here there are shrubs, rhododendrons, junipers, bilberries, and dwarf willows, etc. The sixth zone is the region of perpetual snow. The line of snow varies, according to seasons and localities, from 8,000 to 9,500 feet, but the line is not continuous, being often broken in upon. From this zone descend the glaciers, the most accessible of these being those of Aletsch, Chamonix, and Zermatt. These feed the Swiss lakes and give rise to the Rhine, Rhone and other rivers. Few flowering plants extend above 10,000 feet, but they have been found as high as 12,000 feet.

At this great elevation are found the wild goat and the chamois. In summer the high mountain pastures are covered with large flocks of cattle, sheep, and goats, which are in winter removed to a lower and warmer level. The marmot, and white or Alpine hare, inhabit both the snowy and the woody regions. Lower down are found the wild cat, fox, lynx, bear, and wolf; the last two are now extremely rare. The vulture, eagle, and other birds of prey frequent the highest elevations, the ptarmigan seeks its food and shelter among the diminutive plants that border upon the snow-line. Excellent trout and other fish are found; but the most elevated lakes are, from their low temperature, entirely destitute of fish.

The geological structure of the Alps is highly involved, and is far, as yet, from being thoroughly investigated or understood. In general three zones can be distinguished, a central, in which crystalline rocks prevail, and two exterior zones, in which sedimentary rocks predominate. The rocks of the central zone consist of granite, gneiss, hornblende, mica slate, and other slates and schists. In the western Alps there are also considerable elevations in the central zone that belong to the Jurassic (Oolite) and Cretaceous formations. From the disposition of the beds, which are broken, tilted, and distorted on a gigantic scale, the Alps appear to have been formed by a succession of disruptions and elevations extending over a very protracted period. Among the minerals that are obtained are iron and lead, gold, silver, copper, zinc, alum, and coal.

For railway purposes the Alps have been pierced by five long tunnels, the Alberg, 6¾ miles; the Mont Cenis, 8 miles; the St. Gothard, 9⅓ miles; the Simplon, 12½ miles, and the Loetschberg, 9¼ miles, opened to travel in 1913.

Alpujarras (ăl-pö-*hăr*′răs), a district of Spain, in Andalusia, between the Sierra Nevada and the Mediterranean, mountainous, but with rich and well-cultivated valleys yielding grain, vines, olives, and other fruits. The inhabitants are Christianized descendants of the Moors.

Alquifou (al′ki-fö), a sort of lead ore used by potters as a green varnish or glaze.

Alsace-Lorraine (ăl-zăs′lor-rān′), a department of E. France, bounded by Luxembourg, the Rhine province of Prussia, and the Rhine Palatinate on the north; Baden on the east; Switzerland on the south; and the French departments of Meurthe-et-Moselle and Vosges on the west. The principal river of Alsace is the Ill, which parallels the course of the Rhine and which has given its name to the country (Illsass, Elsass, or Alsace: the country of the Ill). Alsace-Lorraine is very rich in fruits, wines, and cereals; still more important than these is the extensive iron-ore production that was developed while the country was in the hands of Germany, and which proved of great importance to the Germans during the war of 1914-18.

In 1870 the two provinces were wrested from France by Germany and became a part of the German Empire by the law of June 9, 1871. Attempts were made to Germanize the provinces, but these attempts met with little success, and crisis followed crisis. When the great war broke out in 1914 (see *European War*), the French early reoccupied a part of the lost territory, and it was here that American troops made their first appearance in 1917. The peace of 1919 (see *Treaty*) restored the provinces to France and they were provisionally formed into the departments of Bas-Rhine (Lower Alsace, 1848 sq. miles), Haut-Rhin (Upper Alsace, 1354 sq. miles), and Moselle (Lorraine, 2403 sq. miles). Total area, 5605 sq. miles.

The chief towns are Strasbourg, Colmar, Metz, and Mulhouse. Strasbourg was entered by Marshal Pétain, accompanied by General de Castelnau, on November 25, 1918. Alsace was originally a part of ancient Gaul. It afterward became a dukedom of the German empire. Pop. 1,874,000.

Alsatia (al-sā′shya), formerly a cant name for Whitefriars, a district in London between the Thames and Fleet Street, and adjoining the Temple, which, possessing certain privileges of sanctuary, became for that reason a nest of mischievous characters, who were generally obnoxious to the law. These privileges were abolished in 1697. The name

Alsatia is a Latinized form of Alsace.

Alsberg, CARL L., an American chemist, born in New York City, graduated at Columbia University in 1896. From 1908 till 1912 he held a position in the bureau of plant industry in the United States Department of Agriculture. He was then chosen to succeed Dr. Wiley as chief chemist of the Department of Agriculture. Dr. Alsberg has acquired an international reputation as an authority on the biological phases of chemistry.

Alsen (al'zen), an island of Prussia on the east coast of Schleswig-Holstein; 5 to 7 miles; diversified with forests, lakes, well-cultivated fields, orchards, and towns.

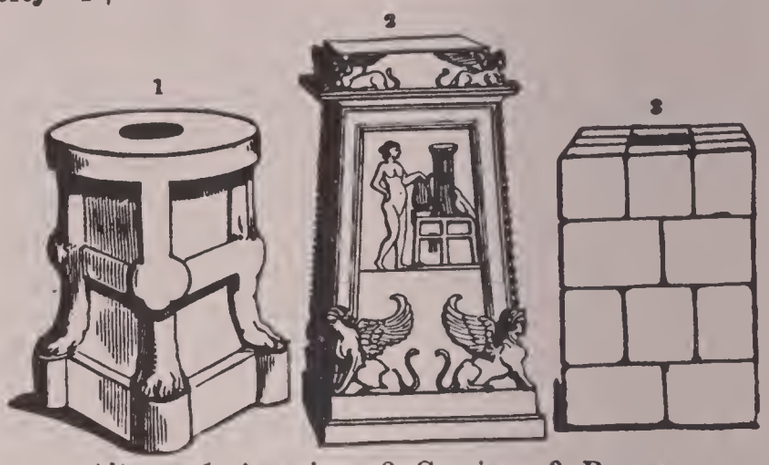
Al Sirat (sē'rat) in Mohammedan belief the bridge extending over the abyss of hell, which must be crossed by every one on his journey to heaven. It is finer than a hair, as sharp as the edge of a sword, and beset with thorns.

Alstrœmeria (ăl-strē-me'ri-a), a genus of South American plants, order *Amaryllidaceæ*, some of them cultivated in European greenhouses and gardens. *A. Salsilla* and *A. ovāta* are cultivated for their edible tubers.

Altai Mountains (ål-tī), an important Asiatic system on the borders of Siberia and Mongolia, partly in Russia and partly in Chinese territory, between lat. 46° and 50° N., lon. 83° and 99° E., but having great eastern extensions. The Russian portion is comprised in the governments of Tomsk and Semipalatinsk, the Chinese in Dsungaria. The rivers in this region are mainly headwaters of the Obi and Irtish. The highest summit is Byelukha, height 14,890 feet. The area covered by perpetual snow is very considerable, and glaciers occupy a wide extent. In the high lands the winter is very severe; but on the whole the climate is comparatively mild and is also healthy. The mountain forests are composed of birch, alder, aspen, fir, larch, stone-pine, etc. The wild sheep has here its native home, and several kinds of deer occur. The Altai is exceeding rich in minerals, including gold, silver, copper, and iron. The name Altai means 'gold mountain.' The inhabitants are chiefly Russians and Kalmuks. The chief town is Barnaul.

Altamura (ăl-tä-mū'rä), a town of South Italy, prov. of Bari, at the foot of the Apennines, walled, well built, and containing a magnificent cathedral. Pop. 22,729.

Altar (ąl'tar), any pile or structure raised above the ground for receiving sacrifices to some divinity. The Greek and Roman altars were various in



Altars.—1, Assyrian. 2, Grecian. 3, Roman.

form, and often highly ornamental; in temples they were usually placed before the statue of the god. In the Jewish ceremonial the altar held an important place, and was associated with many of the most significant rites of religion. Two altars were erected in the tabernacle in the wilderness, and the same number in the temple, according to instructions given to Moses in Mt. Sinai. These were called the altar of burnt-offering and the altar of incense. In some sections of the Christian church the communion-table, or table on which the eucharist is placed, is called an altar. In the primitive church it was a table of wood, but subsequently stone and metal were introduced with rich ornaments, sculpture, and painting. After the introduction of Gothic art the altar frequently became a lofty and most elaborate structure. Originally there was but one altar in a church, but later there might be several in a large church, the chief or *high altar* standing at the east end. Over an altar there is often a painting (an *altar-piece*), and behind it there may be an ornamental *altar-screen* separating the choir from the east end of the church. Lights are often placed on or near the altar—in English churches they are forbidden to be placed on it.

Altazimuth (alt-az'i-muth; abbrev. of *altitude-azimuth*), a vertical circle with a telescope so arranged as to be capable of being turned round horizontally to any point of the compass, and so differing from a *transit-circle*, which is fixed in the meridian. The altazimuth is brought to bear upon objects by motions affecting their altitude and azimuth. Called also *Altitude-and-azimuth instrument.*

Altdorf. See *Altorf.*

Altena (äl'tē-nä), a town of Prussia, Westphalia, 40 miles N. N. E. of Cologne; wire-works, rolling-mills, chain-works, manufactories of needles, pins, thimbles, etc. Pop. 12,769.

Altenburg (äl'ten-berg), a town of Germany, capital of Saxe-Altenburg, 23 miles south of Leipzig. It has some fine streets and many handsome edifices, including a splendid palace; manufactures of cigars, woolen yarn, gloves, hats, musical instruments, glass, brushes, etc. Pop. 38,811.

Alteratives (al'ter-a-tivs), medicines, as mercury, iodine, etc., which, administered in small doses, gradually induce a change in the habit or constitution, and imperceptibly alter disordered secretions and actions, and restore healthy functions without producing any sensible evacuation by perspiration, purging. or vomiting.

Alter ego (al'ter ē'gō; Latin, 'another I'), a second self, one who represents another in every respect. This term was formerly given, in the official style of the Kingdom of the Two Sicilies, to a substitute, appointed by the king to manage the affairs of the kingdom, with full royal power.

Alternate (al-tėr'nāt), in botany, placed on opposite sides of an axis at a different level, as leaves.—*Alternate generation*, the reproduction of young not resembling their parents, but their grandparents, continuously, as in the jelly-fishes, etc. See *Generation, Alternate.*

Althæa (al-thē'a) a genus of plants. See *Hollyhock* and *Marshmallow.*

Altiscope (al'ti-skōp), an instrument, consisting of an arrangement of mirrors in a vertical framework, by means of which a person is enabled to overlook an object (a parapet, for instance) intervening between himself and any view that he desires to see, the picture of the latter being reflected from a higher to a lower mirror, where it is seen by the observer.

Altitude (al'ti-tūd), in mathematics the perpendicular height of the vertex or apex of a plane figure or solid above the base. In astronomy it is the vertical height of any point or body above the horizon. It is measured or estimated by the angle subtended between the object and the plane of the horizon, and may be either *true* or *apparent.* The *apparent* altitude is that which is obtained immediately from observation; the *true* altitude, that which results from correcting the apparent altitude, by making allowance for parallax, refraction, etc.

Altitude-and-azimuth Instrument. See *Altazimuth.*

Alto (al'tō), in music, the highest singing voice of a male adult, the lowest of a boy or a woman, being in the latter the same as *contralto.* The alto, or *counter-tenor*, is not a natural voice, but a development of the *falsetto.* It is almost confined to English singers, and the only music written for it is by English composers. It is especially used in cathedral compositions and glees.

Alton (al'tun), a town of England, in Hampshire, 16 miles N. E. of Winchester, famous for its ale. Pop 5555.

Alton, a city in Illinois, on the Mississippi, 25 miles north of St. Louis. Has many large industries, making bottles, paper, lead, powder, cartridges, tools, steel, flour, oil products, etc. Stone and sand are plentiful. Pop. 24,714; with industrial district, 35,700.

Altona (äl'to-nä), an important commercial city in the Prussian province of Schleswig-Holstein, on the right bank of the Elbe, adjoining Hamburg, with which it virtually forms one city. Pop. 175,000.

Altoona (al-tō'na), a city of Pennsylvania, at the E. base of the Alleghenies, near the highest point in the range, 244 miles W. of Philadelphia. The large railroad shops and locomotive factories of the Pennsylvania R. R., covering 234 acres, are here; also planing and silk mills. The scenery surrounding the city is celebrated for its grandeur. The famous Horse Shoe Curve is 6 miles distant. Pop. (1910) 52,127; (1920) 60,331.

Al'torf, a small town of Switzerland, capital of the canton of Uri, beautifully situated, near the Lake of Luzern, amid gardens and orchards, and memorable as the place where, according to legend, Tell shot the apple from his son's head. A colossal statue of Tell now stands here. Pop. 3147.

Alto-rilievo (ál'tō-rē-lē-ā'vo), high relief, a term applied in regard to sculptured figures to express that they stand out boldly from the background, projecting more than half their thickness, without being entirely detached. In mezzo-rilievo, or middle relief, the projection is one-half, and in basso-rilievo, or bas-relief, less than one-half. Alto-rilievo is further distinguished from mezzo-rilievo by some portion of the figures standing usually quite free from the surface on which they are carved,

while in the latter the figures, though rounded, are not detached in any part.

Altötting (ält-eut'ing), a famous place of pilgrimage, in Bavaria, 52 miles E. N. E. of Munich, near the Inn, where a black wooden image of the Madonna (the Black Virgin) is preserved in a chapel dating from 696, and containing a rich treasure in gold and precious stones; and another chapel in which Tilly was buried. Pop. 4500.

Altranstädt (ält'rân-stet), a village of Saxony, where a treaty was concluded between Charles XII, King of Sweden, and Augustus, Elector of Saxony and King of Poland, September 24, 1706, by which the latter resigned the crown of Poland.

Altrincham (äl'tring-am), a market town of Cheshire, England, 8 miles S. W. of Manchester. Large quantities of fruit and vegetables are raised, and there are several industrial works. It is a suburb of Manchester. Pop. (1921) 20,461.

Altruism (al'trū-izm), a term first employed by the French philosopher Comte, to signify devotion to others or to humanity and now in common use; the opposite of *selfishness* or *egoism.*

Altwasser (ält'vàs-êr), a town of Prussia, in Silesia, 35 miles S. W. of Breslau. Coal-mining and the manufacture of porcelain, machinery, mirrors, etc., are carried on. Pop. 18,000.

Alum, (äl'um) the name of a series of double salts formed by the chemical action of sulphate of aluminum and the sulphate of an alkali metal. Principal alums are potassium alum = $KAl(SO_4)_2 + 12H_2O$, Ammonium alum = $(NH_4)Al(SO_4)_2 + 12H_2O$ and sodium alum = $NaAl(SO_4)_2 + 12H_2O$, the $12H_2O$ representing water of crystalization which when driven off by heat leaves the product *burnt alum.* Characteristics and properties: Crystals are regular octahedrons, colorless and isomorphous; astringent; very soluble in hot water (375.5 crystalized alum in 100 parts water at 100° C.); slightly soluble in cold water (3.9 alum in 100 water at 0° C.); when heated melts in its water of crystalization; heated further decomposes to potassium aluminate. In industries, commercial sulphate of aluminum $Al_2(SO_4)_3$ is called alum and is more extensively used than crystal alum. Former has high aluminum content while latter is free from impurities. Potassium alum occurs in nature in *Alunite* or Alum-stone (q. v.), a mineral salt, and is also obtained from Alum-shale (q. v.). Potassium and ammonium alums and sulphate of aluminum are manufactured on a large scale. They are made by treating bauxite with sulphuric acid to get sulphate of aluminum and then adding either sulphate of potash or sulphate of ammonium and crystalizing to get potash or ammonium alum. Uses: Purification of water, sizing paper, making pigments and production of Lakes, tanning, as a mordant, in medicine as an astringent and styptic and many other purposes. Alum tannage is employed especially for white kid, glove, and light-colored leather.

Alumbagh (*a*-lam-bäg'), a palace and connected buildings in India, about 4 miles south of Lucknow. On the outbreak of the Indian mutiny it was occupied by the revolted Sepoys, and converted into a fort. Sir Henry Havelock was buried within the grounds.

Alumina (al-ū'mi-na, Al_2O_3), the single oxide of the metal aluminum. As found native it is called bauxite or corundum; when crystallized ruby or Oriental amethyst, topaz and emerald; when amorphous emery. It is next to the diamond in hardness. In combination with silica it is one of the most widely distributed of substances, as it enters in large quantity into the composition of granite, traps, slates, schists, clays, loams, and other rocks. The porcelain clays and kaolins contain about half their weight of this earth, to which they owe their most valuable properties. It has a strong affinity for coloring matters, which causes it to be employed in the preparation of the colors called *lakes* in dyeing and calico-printing. It combines with the acids and forms numerous salts, the most important of which are the sulphate (see *Alum*) and acetate, the latter of extensive use as as a mordant.

Aluminum (al-ū'mi-num), or ALUMINIUM (al-u-min'i-um), an elementary metal, symbol Al, atomic weight 27.01, color similar to tin, very light in weight, specific gravity 2.58 cast to 2.69 hammered, does not tarnish or oxidize in the air, very ductile and malleable, melts at 694° C., insoluble in water and cold nitric and sulphuric acids, soluble in caustic alkalies and hot nitric and sulphuric acids. When first isolated in 1828 it cost several hundred dollars a pound. In 1860 it cost about $140 a pound and was then extracted from clay by metallic sodium, until the electrolytic process of extraction was discovered by Chas. M. Hall. It is nowhere found native, although as the metallic base of clay it is extremely abundant. It is made by an electrolytic process from bauxite (alumina) mined in Oklahoma, Utah, Colorado, California, Arizona, Nevada, Arkansas, Alabama and Georgia. Produc-

tion increased from 83 lbs. in 1883 to 400,000,000 lbs. in 1918. Aluminum is used for kitchen utensils, automobile parts, air-plane bodies and wings, high voltage power transmission wires, telescopes, alloys such as aluminum bronze and magnalium, novelties, printing plates, thin sheets as substitute for tin-foil and for many special purposes such as its use in the Serpek process for nitrogen fixation, incendiary bombs, and in the thermit process of welding in which powdered aluminum is mixed with iron oxide and ignited. A combustion temperature of 6000° F. is obtained which produces molten iron. Aluminum is also used for plating iron. The oxide of aluminum is of commercial importance in the form of corundum, emery, ruby and sapphire, and also as a raw material for making metallic aluminum. Aluminum acetate is principally used as a mordant in dyeing and printing and in the water-proofing of fabrics.

Alum-root, the name given to two plants of the United States, greatly different, but both having roots of remarkable astringency, which are used for medical purposes. One of these is *Geranium maculatum;* the other is *Heuchera Americana,* a plant of the Saxifrage order. Its root is a powerful styptic and is sometimes employed in medicine to form a wash for wounds and obstinate ulcers.

Alum-shale, ALUM-SCHIST, a slaty rock from which much alum is prepared; color grayish, bluish, or iron-black; often possessed of a glossy or shining luster; chiefly composed of clay (silicate of alumina), with variable proportions of sulphide of iron (iron pyrites), lime, bitumen, and magnesia.

Alum-stone, a mineral of a grayish or yellowish-white color, approaching to earthy in its composition, from which (in Italy) is obtained a very pure alum by simply subjecting it to a process of roasting and lixiviation.

Alunno (a-lū′nō), NICCOLO (real name Niccolò di Liberatore), an Italian painter of the fifteenth century, the founder of the Umbrian School; born in Foligno about 1430; died 1502.

Alva, a town of Scotland, Stirlingshire, 7 miles N. E. of Stirling, in a detached portion of the county, surrounded by Clackmannan and Perthshire; manufactures of woolen shawls, plaids, etc. Pop. 4332.

Alva, or ALBA, FERDINAND ALVAREZ, DUKE OF, Spanish statesman and general under Charles V and Philip II; was born in 1508; early embraced the military career, and fought in the wars of Charles V in France, Italy, Africa, Hungary, and Germany. He is more especially remembered for his bloody and tyrannical government of the Netherlands (1567–73), which had revolted, and which he was commissioned by Philip II to reduce to entire subjection to Spain. Among his first proceedings was to establish the 'Council of Blood,' a tribunal which condemned, without discrimination, all whose opinions were suspected and whose riches were coveted. The present and absent, the living and the dead, were subjected to trial and their property confiscated. Many merchants and mechanics emigrated to England; people by hundreds of thousands abandoned their country. The Counts of Egmont and Horn, and other men of rank, were executed, and William and Louis of Orange had to save themselves in Germany. The most oppressive taxes were imposed, and trade was brought completely to a standstill. As a reward for his services to the faith the pope presented him with a consecrated hat and sword, a distinction previously conferred only on princes. Resistance was quelled only for a time, and soon the provinces of Holland and Zealand revolted against his tyranny. A fleet which was fitted out at his command was annihilated, and he was everywhere met with insuperable courage. Hopeless of finally subduing the country he asked to be recalled, and accordingly, in December, 1573, Alva left the country, in which, as he himself boasted, he had executed 18,000 men. He was received with distinction in Madrid, but did not long enjoy his former credit. He had the honor, however, before his death (which took place in 1582) of reducing all Portugal to subjection to his sovereign. It is said of him that during sixty years of warfare he never lost a battle and was never taken by surprise.

Alvarado (ål-vå-rä′dō), PEDRO DE, one of the Spanish 'conquistadors,' was born towards the end of the fifteenth century, and died in 1541. Having crossed the Atlantic, he was associated (1519) with Cortez in his expedition to conquer Mexico; and was entrusted with important operations. In July, 1520, during the disastrous retreat from the capital after the death of Montezuma, the perilous command of the rearguard was assigned to Alvarado. On his return to Spain he was received with honor by Charles V, who made him governor of Guatemala, which he had himself conquered. To this was subsequently added Honduras. He continued to add to the Spanish dominions in America till his death.

Alvarez (ål'vå-reth), Don José, a Spanish sculptor; born 1768, died 1827. His works are characterized by truth to nature, dignity and feeling, one of the chief representing a scene in the defense of Saragossa.

Alveolus (al-vē'ō-lus), one of the sockets in which the teeth of mammals are fixed. Hence *alveolar arches*, the parts of the jaws containing these sockets.

Alwar (*al-war'*), a state of northwestern Hindustan, in Rajputana; area, 3,024 square miles; surface generally elevated and rugged, and much of it of an arid description, though water is generally found on the plains by digging a little beneath the surface, and the means of irrigation being thus provided, the soil, though sandy, is highly productive. This semi-independent state has as its ruler a rajah with a revenue of about $1,000,000; military force, about 5,000 infantry and 2000 cavalry. Pop. (1901) 828,487.—Alwar, the capital, is situated at the base of a rocky hill crowned by a fort, 80 miles S. S. W. of Delhi, surrounded by a moat and rampart, and poorly built, but with fine surroundings; contains the rajah's palace and a few other good buildings. Pop. 56,771.

Alyssum (a-lis'sum), a genus of cruciferous plants, several species of which are cultivated on account of their white or yellow-colored flowers; madwort.

Amad'avat (*Estrilda amandāva*), a small Indian singing bird allied to the finches and buntings; sober-colored, often kept in cages.

Amadeus (a-ma-dā'us), the name of several counts of Savoy. The first was the son of Humbert I, and succeeded him in 1048, dying about 1078; others who have occupied an important place in history are the following:—Amadeus V, 'the Great,' succeeded in 1285, gained distinguished honor in defending Rhodes against the Turks, increased his possessions by marriage and war, was made a prince of the empire, died in 1323.—Amadeus VIII succeeded his father, Amadeus VII, in 1391, and had his title raised to that of duke by the Emperor Sigismund. He was chosen regent of Piedmont; but after this elevation retired from his throne and family into a religious house. He now aspired to the papacy, and was chosen by the Council of Basel (1439), becoming pope under the name of Felix V, though he had never taken holy orders. He resigned in 1449, and died in 1451.

Amade'us, Duke of Aosta, second son of Victor Emmanuel of Italy, and uncle of the present king, was born in 1845, and was chosen by the Cortes King of Spain in 1870, Queen Isabella having had to leave the country in 1868. His position was far from comfortable, however, and perceiving that, as a member of a foreign dynasty, he had little hope of becoming acceptable to all parties in the state, he abdicated in 1873 and returned to Italy. Died 1890.

Amade'us, Lake, a large salt lake or salt swamp nearly in the center of Australia.

Amadis (am'a-dis), a name belonging to a number of heroes in the romances of chivalry, Amadis de Gaul being the greatest among them, and represented as the progenitor of the whole. The Spanish series of Amadis romances is the oldest. It is comprised in fourteen books, of which the first four narrate the adventures of Amadis de Gaul, this portion of the series having originated about the end of the thirteenth or beginning of the fourteenth century, and the subsequent books being added by various hands. An abridged English translation of Amadis of Gaul was published by Southey in 1803.

Amadou (am'a-dö), a name of several fungi, genus *Polypŏrus*, of a leathery appearance, growing on trees. See *German Tinder*.

Amager (ăm'a-ger), a small Danish island in the Sound, opposite Copenhagen, part of which is situated on it. Pop. 20,000.

Amakosa, one of the Kaffir tribes of S. Africa.

Amalekites (a-mal'e-kīts), a Semitic race occupying the peninsula between Egypt and Palestine, named after a grandson of Esau. They were denounced by Moses for their hostility to the Israelites during their journey through the wilderness, and they seem to have been all but exterminated by Saul and David.

Amalfi (ä-mal'fi), a seaport in Southern Italy, on the Gulf of Salerno, 23 miles from Naples, the seat of a bishop; formerly a place of great commercial importance, in the middle ages enjoying a republican constitution of its own. Here arose the *Amalfitan Code* of maritime law. Pop. 7368.

Amalgam (a-mal'gam), a name applied to the alloys of mercury with the other metals. One of them is the amalgam of mercury with tin, which is used to silver looking-glasses. Mercury unites very readily with gold and silver at ordinary temperatures, and advantage is taken of this to separate them from their ores, the process being called *amal-*

gamation. The mercury being properly applied dissolves and combines with the precious metal and separates it from the waste matters, and is itself easily driven off by heat.

The Cathedral, Amalfi.

Amanita (a-ma-nī′ta), a genus of fungi, one species of which *A. muscāria*, or fly-agaric, is extremely poisonous.

Ama′nus, a branch of the Taurus Mountains in Asia Minor.

Amaranthaceæ (am-a-ran-thā′se-ē), the amaranths, a nat. order of apetalous plants, chiefly inhabiting tropical countries, where they are often troublesome weeds. They are remarkable for the white or sometimes reddish scales of which their flowers are composed. *Amaranthus*, the typical genus, comprises *A. caudātus*, or love-lies-bleeding, a common plant in gardens, with pendulous racemes of crimson flowers; and *A. hybridus*, the showy princes' feather. The blossoms keep their bloom after being plucked and dried (hence the name: Gr. *a*, not, and *marainein*, to wither).

Amarapura (*a*-ma-*ra*-pö′*ra*), a deserted city, once the capital of the Burmese Empire, on the left bank of the Irawaddy, 10 miles N. E. of Ava. In 1810 it was completely destroyed by fire, in 1839 it was visited by an earthquake. Pop. in 1800 was 175,000; now about 10,000.

Amarillo (am-å-ril′lō), a city, county seat of Potter county, Texas, 361 miles N. W. of Dallas, on three trunk lines, center of world's largest natural gas field within 20-mile radius. Live stock and farm products chief industries. Trade center of the Panhandle District of Texas. Pop. (1910) 9957; (1920) 15,494.

Amaryllidaceæ (a-ma-ril-i-dā′ce-ē), an order of monocotyledonous plants, generally bulbous, occasionally with a tall, cylindrical, woody stem (as in Agave); with a highly colored flower, six stamens, and an inferior three-celled ovary; natives of Europe and most of the warmer parts of the world. The order includes the snowdrop, the snow-flake, the daffodil, the belladonna-lily (belonging to the typical genus Amaryllis), the so-called Guernsey lily (probably a native of Japan), the Brunsvigias, the blood-flowers (Hæmanthus) of the Cape of Good Hope, different species of Narcissus, Agave (American aloe), etc. Many are highly prized in gardens and hothouses; the bulbs of some are strongly poisonous.

Amasia (å-mā-se′a), a town in north of Asia Minor, on the Irmak, 60 miles from the Black Sea, surmounted by a rocky height in which is a ruined fortress; has numerous mosques, richly-endowed Mohammedan schools, and a trade in wine, silk, etc. Amasia was a residence of the ancient kings of Pontus. Pop. 30,000.

Amasis (a-mā′sis), King of Egypt from 569 to 526 B. C., obtained the throne by rebelling against his predecessor Apries, and is chiefly known from his friendship for the Greeks, and his wise government of the kingdom, which, under him, was in the most prosperous condition.

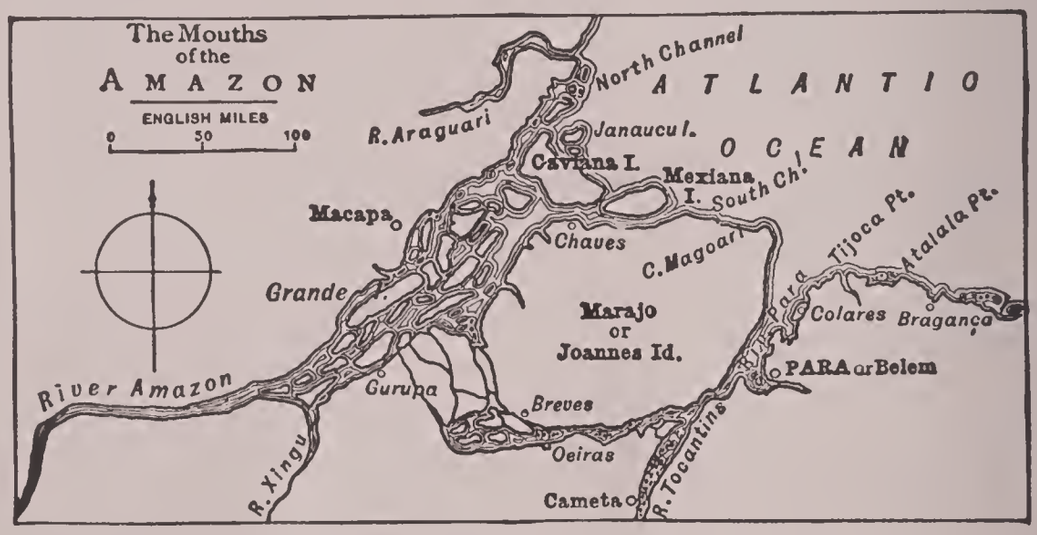
Amati (ä-mä′tē), a family of Cremona who manufactured violins in the sixteenth and seventeenth centuries. Andrea (about 1540-1600) was the founder of the business, which was carried on by his sons Geronimo and Antonio, and by Nicolo the son of Geronimo. Most of the violins made by them are of comparatively small size and flat model, and the tone produced by the fourth or G string is somewhat thin and sharp. Many of Nicolo Amati's violins are, however, of a larger size and have all the fullness and intensity of tone characteristic of those manufactured by Stradivari and Guarneri.

Amatitlán (a-ma-tit′lan), a town in Central America, State of Gautemala, about 15 miles south of the city of Guatemala, a busy modern town, the inhabitants of which are actively

ngaged in the cochineal trade. There is a small lake of same name close to the own. Pop. 10,000.

Amaurosis (am-au-rō'sis; Greek *amauros*, dark), a species of blindness, formerly called *gutta serena* (the 'drop serene,' as Milton, whose blindness was of this sort, called it), caused by disease of the nerves of vision. The most frequent causes are a long-continued direction of the eye on minute objects, long exposure to a bright light, to the fire of a forge, to snow, or irritating gases, overfullness of blood, disease of the brain, etc. If taken in time it may be cured or mitigated; but confirmed amaurosis is usually incurable.

Amaxichi (a-maks-ē'kē), the chief town and seaport of Santa Maura (Leukadia), one of the Ionian Isles, the seat of a Greek bishop; manufactures cotton and leather. Pop. 6,000.



Amazon, AMAZONS (am'a-zon), a river of South America, the largest in the world, formed by a great number of sources which rise in the Andes; the two head branches being the Tunguragua or Maranon and the Ucayale, both rising in Peru, the former from Lake Lauricocha, in lat. 10° 29′ S., the latter formed by the Apurimac and Urubamba, the head-waters of which are between lat. 14° and 16° S., general course north of east; length including windings between 3,000 and 4,000 miles; area of drainage basin 2,300,000 sq. miles. It enters the Atlantic under the equator by a mouth 200 miles wide, divided into two principal and several smaller arms by the large island Marajo, and a number of smaller islands. In its upper course navigation is interrupted by rapids, but from its mouth upwards for a distance of 3300 miles (mostly in Brazil) there is no obstruction. It receives the waters of about 200 tributaries, 100 of which are navigable, and seventeen of these 1000 to 2300 miles in length; northern tributaries: Santiago, Morona, Pastaza, Tigre, Napo, Putumayo, Japura, Rio Negro (the Cassiquiare connects this stream with the Orinoco), etc.; southern: Huallaga, Ucayale, Javari, Jutay, Jurua, Coary, Purus, Madeira, Tapajos, Xingu, etc. At Tabatinga where it enters Brazilian territory, the breadth is 1½ miles; below the mouth of the Madeira it is 3 miles wide, and where there are islands often as much as 7; from the sea to the Rio Negro, 750 miles in a straight line, the depth is nowhere less than 30 fathoms; up to the junction of the Ucayale there is depth sufficient for the largest vessels. The Amazonian water system affords some 31,000 miles of river suitable for navigation. The rapidity of the river is considerable, especially during the rainy season (January to June), when it is subject to floods; but there is no great fall in its course. The tides reach up as far as 400 miles from its mouth. The singular phenomenon of the *bore*, or as it is called on the Amazon the *pororoca*, occurs at the mouth of the river at spring-tides on a grand scale. The river swarms with alligators, turtles, and a great variety of fish. The country through which it flows is extremely fertile, and is mostly covered with immense forests; it must at some future time support a numerous population, and be the theater of a busy commerce. Steamers and other craft ply on the river, the chief center of trade being Para, at its mouth. The Amazon was discovered by Yanez Pinzon in 1500, but the stream was not navigated by any European till 1540, when Francis Orellana descended it. Orellana stated that he found on its banks a nation of armed women (an incorrect statement),

and this circumstance gave the name to the river.

Amazonas (am-a-zō′nas), the largest state of Brazil, traversed by the Amazon and its tributaries: area, 731,363 sq. miles; pop. about 300,000. Capital and chief port Manaos.

Am′azons, according to an ancient Greek tradition, the name of a community of women, who permitted no men to reside among them, fought under the conduct of a queen, and long constituted a formidable State. They were said to burn off the right breast that it might not impede them in the use of the bow—a legend that arose from the Greeks supposing the name was from *a*, not, *mazos*, breast. It is probably from *a*, together, and *mazos*, breast, the name meaning therefore sisters. Several nations of Amazons are mentioned, the most famous being those who dwelt in Pontus, who built Ephesus and other cities. Their queen, Hippolyta, was vanquished by Hercules. They attacked Attica in the time of Theseus. They came to the assistance of Troy under their queen, Penthesilēa, who was slain by Achilles.

Amazu′lu, a branch of the Zulu Kaffir race. See *Zulus*.

Ambala (am-bal′a), UMBALL′A, a town of India, in the Punjab, in an open plain 3 miles from the Ghaggar, consisting of an old and a new portion, with a flourishing trade in grain and other commodities. The military cantonment is several miles distant. Total pop. 78,638.

Ambalema (åm-bå-lā′må), a town of S. America, Colombia, on the Magdalena; the center of an important tobacco district. Pop. 8,000.

Ambaree (am′ba-rē), a fiber similar to jute largely used in India, obtained from *Hibiscus cannabīnus*.

Ambassador (am-bas′a-dur), a minister of the highest rank, employed by one prince or state at the court of another to manage the public concerns, or support the interests of his own prince or state, and representing the power and dignity of his sovereign or state. Ambassadors are *ordinary* when they reside permanently at a foreign court, or *extraordinary* when they are sent on a special occasion. When *ambassadors extraordinary* have full powers, as of concluding peace, making treaties, and the like, they are called *plenipotentiaries*. Ambassadors are often called simply *ministers*. *Envoys* are ministers employed on special occasions, and are of less dignity than ambassadors. The United States, until 1893, had never sent an agent of the diplomatic rank of ambassador. They had been represented by ministers-plenipotentiary. In that year the president was authorized to raise representatives to foreign governments to the rank of ambassador when notified that their representatives to the United States were to be likewise exalted. It now has ambassadors to Great Britain, Germany, France, Austria-Hungary, Italy, Russia, Turkey, Brazil, Mexico and Japan, being represented by ministers in other countries.

Ambatch (*Æschynomene elaphroxylon*), a thorny, leguminous shrub with yellow flowers growing in the shallows of the Upper Nile and other rivers of tropical Africa.

Ambato (äm-bä′tō), a town of Ecuador, on the side of Chimborazo, 70 miles south of Quito. Pop. 10,000.

Am′ber, a semi-mineral substance of resinous composition, a sort of fossil resin, the product of extinct Coniferæ. It is usually of yellow or reddish-brown color; brittle; yields easily to the knife; is translucent, and possessed of a resinous luster. Specific gravity, 1.065. It burns with a yellow flame, emitting a pungent, aromatic smoke, and leaving a light, carbonaceous residue, which is employed as the basis of the finest black varnishes. By friction it becomes strongly electric. It is found in masses from the size of coarse sand to that of a man's head, and occurs in beds of bituminous wood situated upon the shores of the Baltic and Adriatic Seas; also in Poland, France, Italy, and Denmark. It is often washed up on the Prussian shores of the Baltic, and is also obtained by fishing for it with nets. Sometimes it is found on the east coast of Britain, in gravel pits round London, also in the United States.

Amberg (äm′berg), a town of south Germany, in Bavaria, on the Vils, well built, with a Gothic church of the fifteenth century, royal palace, townhouse, etc.; manufactures of ironwares, stoneware, tobacco, beer, vinegar, and arms. Pop. 22,089.

Ambergris (am′ber-gris), a substance derived from the intestines of the sperm-whale, and found floating or on the shore; yellowish or blackish white; very light; melts at 140°, and is entirely dissipated on red-hot coals; is soluble in ether, volatile oils, and partially in alcohol, and is chiefly composed of a peculiar fatty substance. Its odor is very agreeable, and hence it is used as a perfume.

Ambidextrous (am-bi-d e k s′t r u s), having the faculty of using the left hand as effectively as the right.

Ambleteuse (än-bl-t*euz*), a small seaport of France, 6 miles from Boulogne. Here James II landed on his flight from England in 1688; and from its harbor Napoleon I prepared to despatch a flotilla of flat-bottomed boats for the invasion of Britain.

Amblyopsis (am-bli-op′sis), a genus of blind fishes, containing only one species, *A. spelæus*, found in the Mammoth Cave of Kentucky.

Amblyopy (am′bli-ō-pi), dullness or obscurity of eyesight without any apparent defect in the organs; the first stage of amaurosis.

Am′bo, AM′BON, in early Christian churches a kind of raised desk or pulpit, sometimes richly ornamented, from which certain parts of the service were read, or discourses delivered, there being sometimes two in one church.

Amboina. See *Amboyna.*

Amboise (äṇ-bwäz), a town of France, dep. Indre-et-Loire, 12 miles E. of Tours, on the Loire, with an antique castle, the residence of several French kings, and manufactures of files and rasps. Pop. (1906) 4632.

Amboy′na (ām-boi′na), AMBOINA, or APON, one of the Molucca Islands in the Indian Archipelago, close to the large island of Ceram; area, 262 sq. miles. Here is the seat of government of the Dutch residency or province of Amboyna, which includes also Ceram, Booro, etc. Its surface is generally hilly or mountainous, its general aspect beautiful, and its climate on the whole salubrious, but it is not unfrequently visited by earthquakes. It affords a variety of useful trees, including the cocoanut and sago palms. Cloves and nutmegs are the staple productions. The soil in the valleys and along the shores is very fertile, but a large portion remains uncultivated. The natives are mostly of Malayan race. The capital, also called AMBOYNA, is situated on the Bay of Amboyna, and is well built and defended by a citadel. The streets are planted on each side with rows of fruit-trees. It is a free port. Pop. 10,500. In 1607 Amboyna and the other Moluccas were taken by the Dutch from the Portuguese, and it was for some years the seat of government of the Dutch East Indies. Trade with the Moluccas was secured to the British by treaty in 1619, but the British establishment was destroyed and several persons massacred in 1623, an outrage for which no satisfaction was obtained till 1654 by Cromwell. Amboyna was taken by the British in 1796 and 1810, but each time restored to the Dutch. Pop. 38,663.

Ambracia. See *Arts.*

Ambridge, a borough of Beaver Co., Pa., on Ohio River, 16 miles N. W. of Pittsburgh. It has steel and metal products. Pop. 12,730.

Am′brose, SAINT, a celebrated father of the church; born in A. D. 333 or 334, probably at Treves, where his father was prefect; died in 397. He was educated at Rome, studied law, practised as a pleader at Milan, and in 369 was appointed governor of Liguria and Æmilia (North Italy). His kindness and wisdom gained him the esteem and love of the people, and in 374 he was unanimously called to the bishopric of Milan, though not yet baptized. For a time he refused to accept this dignity, but he had to give way, and at once ranged himself against the Arians. In his struggles against the Arian heresy he was opposed by Justina, mother of Valentinian II and for a time by the young emperor himself, together with the courtiers and the Gothic troops. Backed by the people of Milan, however, he felt strong enough to deny the Arians the use of a single church in the city, although Justina, in her son's name, demanded that two should be given up. He had also to carry on a war with paganism, Symmachus, the prefect of the city, an eloquent orator, having endeavored to restore the worship of heathen deities. In 390, on account of the ruthless massacre at Thessalonica ordered by the emperor Theodosius, he refused him entrance into the church of Milan for eight months. The later years of his life were devoted to the more immediate care of his see. His writings, which are numerous, show that his theological knowledge extended little beyond an acquaintance with the works of the Greek fathers. He wrote Latin hymns, but the *Te Deum Laudamus*, which has been ascribed to him, was written a century later. He introduced the *Ambrosian Chant*, a mode of singing more monotonous than the Gregorian which superseded it. He also compiled a form of ritual known by his name.

Ambrosia (am-brō′zhi-a), in Greek mythology the food of the gods, as nectar was their drink.

Ambrosian Chant. See *Ambrose.*

Ambrosian Library, a public library in Milan founded by the cardinal archbishop Federigo Borromeo, a relation of St. Charles Borromeo, and opened in 1609; now containing 160,000 printed books and many MSS. It was named in honor

of St. Ambrose, the patron saint of Milan.

Ambry (am'bri), a niche or recess in the wall of ancient churches near the altar, fitted with a door and used for keeping the sacred utensils, etc.

Ambulacral (am-bū-lā'kral) System, the locomotive apparatus of the Echinodermata (sea-urchins, starfishes, etc.), the most important feature of which is the protrusible tube-feet that the animals can at will dilate with water and thus move forward.

Ambulance (am'bū-lans), a hospital establishment which accompanies an army in its movements in the field for the purpose of providing assistance and surgical treatment to the soldiers wounded in battle. The name is often given to one of the carts, wagons, or litters used to transfer the wounded from the spot where they fell to the hospital, and also for the ordinary use of city hospitals. One form of ambulance wagon is a strong but light vehicle with an upright frame, from which two stretchers are slung from the top for the accommodation of those most severely wounded; seats before and behind are provided for those suffering from less serious wounds. The hospital chests, containing surgical instruments, bandages, splints, etc., are placed in the bottom of the wagon or lashed to its under surfaces. A thorough ambulance system in connection with armies in the field is quite of recent introduction. A training in ambulance work is now being recognized as of importance beyond the field of military affairs, and as being of the utmost service wherever serious accidents are likely to happen, as, for instance, in connection with large industrial establishments.

Amelanchier (am-el-an'kē-ėr), a genus of small trees natives of Europe and N. America, the Linnean name of the rock-medlar. It has long been cultivated for its showy white flowers; *A. botryāpium* (grape-pear) and *A. ovālis*, American species, yield pleasant fruits.

Ameland (ä'me-lånt), an island off the north coast of Holland, 13 miles long and 3 broad; flat; inhabitants (about 2,000 in number) chiefly engaged in fishing and agriculture.

Amelie-les Bains (a-mā-lē-lā-baṇ), a health resort of France, dep. Pyrénées Orientales, frequented as a winter residence for invalids, and for its warm, sulphurous springs.

Amen (ā-men'), a Hebrew word, signifying 'verily,' 'truly,' transferred from the religious language of the Jews to that of the Christians, and used at the end of prayers as equivalent to 'so be it,' 'may this be granted.'

Amendment (a-mend'ment), a proposal brought forward in a meeting of some public or other body, either in order to get an alteration introduced on some proposal already before the meeting, or entirely to overturn such proposal. When amendments are made in either House of Congress upon a bill which passed the other, the bill, as amended, must be sent back to the other House. The Senate may amend money bills passed by the House of Representatives, but cannot originate such bills. Art. V of the Constitution of the United States contains a provision for its amendment.

Amenophis III (a-men-ō'fis), or AMENHOTEP, king of Egypt in the most glorious days of the Empire, about 1400 B.C. He built magnificent palaces and temples at Thebes.

Amenophis IV, son of AMENOPHIS III, endeavored to supplant the polytheistic religion of Amen with the monotheistic worship of Aten, changing his name to Akhen-aten, and removing his capital to Khut-aten, the modern Tel-el-Amarna. In the reign of his successor, Tut-ankh-amen (q. v.), the old religion was restored.

Amentaceæ (a-men-tā'se-ē), an order of plants having their flowers arranged in amenta or catkins; formerly considered as forming a natural group, but separated by later botanists into several different families, as *Salicaceæ*, *Myricaceæ*, *Betulaceæ*, *Fagaceæ*, etc.

Amentia (a-men'shi-a), imbecility from birth.

Amentum (a-men'tum), in botany, that kind of inflorescence which is commonly known as a catkin (as in the birch or willow), consisting of unisexual apetalous flowers in the axil of scales or bracts.

Amentum.
Willow (*Salix fragilis*), male and female, with separate flowers.

America (a-mer'i-ka), frequently spoken of as the NEW WORLD, the largest of the great divisions of the globe except Asia, is washed on the west by the Pacific, on the east by the Atlantic, on the north by the Arctic Ocean, on the south tapers to a point. On the northwest it approaches

within about 50 miles of Asia, while on the northeast the island of Greenland approaches within 370 miles of the European island Iceland; but in the south the distance between the American mainland and Europe or Africa is very great. Extreme points of the continent—north, Boothia Felix, at the Strait of Bellot, lat. 72° N.; south, Cape Horn, lat. 56° S.; west, Cape Prince of Wales, lon. 168° W.; east, Point de Guia, lon. 35° W. America as a whole forms the two triangular continents of North and South America, united by the narrow Isthmus of Panama, and having an entire length of about 10,000 miles; a maximum breadth (in North America) of 3,500 miles; a coast line of 44,000 miles; and a total area, of about 16,500,000, of which N. America contains about 8,700,000 sq. miles. South America is more compact in form than N. America, in this respect resembling Africa, while N. America more resembles Europe. Between the two on the east side is the great basin which comprises the Gulf of Mexico, the Caribbean Sea, and the West India Islands. Like Europe also N. America possesses numerous islands, while those of S. America are less important and confined almost to the southern extremity.

Three-fourths of the area of America is comparatively flat, and this portion of the surface is bounded on the west by lofty mountain systems which stretch continuously from north to south between the extremities of the continent, generally at no great distance from the west shore. In North America the Rocky Mountains, a broad series of masses partly consisting of plateaus, form the most important portion of the elevated surface, being continued southward in the mountains and tableland of Mexico and the ranges of Central America. Separated by depressions from the Rocky Mountains proper, and running close to and parallel with the western coast, are several lofty ranges (Sierra Nevada, Cascade Mountains, etc.). Near the eastern coast, and forming an isolated mass, are the Appalachians, a system of much inferior magnitude. The loftiest mountains in N. America of definitely known elevation are Mts. McKinley, 20,464; Nevado de Toluca, 15,168; Orizaba, 18,314; and St. Elias, 18,026 feet high. The depression of the Isthmus of Panama (about 260 feet) forms a natural separation between the systems of the north and the south. In S. America the Andes form a system of greater elevation but less breadth than the Rocky Mountains and consist of a series of ranges (*cordilleras*) closely following the line of the west coast from the Isthmus of Panama to Cape Horn. The highest summits seem to be Aconcagua (22,860 feet), Sorata or Illampu (21,484), and Sahama (21,054). Volcanoes are numerous. Isolated mountain groups of minor importance are the highlands of Venezuela and of Brazil, the latter near the eastern coast, reaching a height of 10,000 feet.

The fertile lowlands which lie to the east of the Rocky Mountains and the Andes form a depression extending through both continents from the northern to the southern oceans. They have somewhat different features and different names in different portions; in N. America are *prairies* and *savannahs*, in S. America *llanos*, *selvas*, and *pampas*.

Through these low grounds flow the numerous great rivers which form so characteristic a feature of America. The principal are the Mackenzie, Coppermine, and Great Fish rivers, entering the Northern Ocean; the Churchill, Nelson, Severn, and Albany, entering Hudson Bay; the St. Lawrence, entering the Atlantic; Mississippi and Rio del Norte, entering the Gulf of Mexico (all these being in N. America); the Magdalena, Orinoco, Amazon, Paranahiba, Rio de la Plata, Colorado, and Rio Negro, entering the Atlantic (all in S. America); and the Yukon, Fraser, Colombia, San Joaquin, Sacramento, and Colorado, entering the Pacific. The rivers which flow into the Pacific, however, owing to the fact that the great backbone of the continent, the Rocky Mountains and the Andes, lies so near the west coast, are of comparatively little importance, in S. America being all quite small. Sometimes rivers traversing the same plains, and nearly on the same levels, open communications with each other, a remarkable instance being the Cassiquiare in S. America, which, branching off from the Rio Negro and joining the Orinoco, forms a kind of natural canal, uniting the basins of the Orinoco and the Amazon. The Amazon or Maranon in S. America, the largest river in the world, has a course of about 3,500 miles, and a basin of 2,300,000 square miles; the Mississippi-Missouri, the largest river of North America, runs a longer course than the Amazon, but the area of its basin is not nearly so great. North America has the most extensive group of lakes in the world—Lakes Superior, Michigan, Huron, Erie, and Ontario, which through the St. Lawrence send their drainage to the Atlantic. Thus by means of lakes and rivers the interior of both N. and S. America is opened up and made accessible.

In regard to climate N. America naturally differs very much from S.

America, and has more resemblance to the continents of Europe and Asia (regarded as a whole). In N. America, as in the older continent, the eastern parts are colder than the western, and hence the towns on the Atlantic coast have a winter temperature about 10° lower than those in corresponding latitudes of Europe. The winter temperature of the greater part of N. America is indeed severe, though the intense cold is less felt on account of the dryness of the air. There is no regular season of rainfall unless in the south. Although two-thirds of S. America lies within the tropics the heat is not so great as might be expected, owing to the prevailing winds, the influences of the Andes, and other causes. The highest temperature experienced is probably not more than 100° in the shade; at Rio de Janeiro the mean is about 74°, at Lima 72°. Over great part of S. America there is a wet and a dry season, varying in different regions; on the upper Amazon the rains last for ten months, being caused by the prevailing easterly winds bringing moisture from the Atlantic, which is condensed on the eastern slopes of the Andes. In each of the Americas there is a region in which little or no rain falls; in N. America it extends over the south-western part of the United States and Northern Mexico, in S. America over a part of the coast region of Peru and Chile.

America is rich in valuable minerals. It has supplied the world with immense quantities of gold and silver, which it still yields in large amount, especially in the United States. It possesses enormous stores of coal (U. States), with an abundance of iron, copper, lead, mercury, etc. Petroleum may be called one of its specialties, its petroleum wells having yielded vast quantities of this useful material and having no rivals except at Baku, Russia.

As regards vegetation America may be called a region of forests and verdure, vast tracts being covered by the grassy prairies, llanos, and pampas where the forests fail. In N. America the forests have been largely made use of by man; in S. America immense areas are covered with forests, which as yet are traversed only by the uncivilized Indian. In the north is the region of pines and firs; farther south come the deciduous trees, as the oak, beech, maple, elm, chestnut, etc. Then follow the evergreen forests of the tropical regions. The useful timber trees are very numerous; among the most characteristic of America are mahogany and other ornamental woods, and various dyewoods. In the tropical parts are numerous palms, cacti in great variety, and various species of the agave or American aloe. In the virgin forests of S. America the trees are often bound together into an impenetrable mass of vegetation by various kind of climbing and twining plants. Among useful plants belonging to the American continent are maize, the potato, cacao, tobacco, cinchona, vanilla, Paraguay tea, etc. The most important plants introduced are wheat, rice, and other grains, sugar-cane, coffee, and cotton, with various fruits and vegetables. The vine is native to the continent, and both the American and introduced varieties are now largely cultivated.

The distinctive animals of America include, among carnivora, the jaguar or American tiger, found as far north as Texas; the Puma or American lion, found in both Americas; the grizzly bear of N. America, a more powerful animal than either; the black bear, the polar bear, the lynx, the raccoon, the American or prairie wolf, several species of foxes, etc. The rodents are represented by the beaver, the porcupine, and squirrels of several species; the marsupials by the opossum. Among ruminants are the bison, or, as it is commonly called, the buffalo, the moose or elk, the Virginian stag, the musk-ox; and in S. America the llama (which takes the place of the camel of the Old World), the alpaca, and the vicuna. Other animals most distinctive of S. America are sloths, fitted to live only in its dense and boundless forests; ant-eaters and armadillos; monkeys with prehensile tails, in this and other respects differing from those of the Old World; the condor among the heights of the Andes, the nandu, rhea or three-toed ostrich, beautiful parrots and humming-birds. Among American reptiles are the boa-constrictor, the rattlesnake, the alligator or cayman, the iguana and other large lizards, large frogs and toads. The domestic animals of America, horses, cattle, sheep, and swine, are of foreign origin. The electrical eel exists in the tropical waters.

The population of America consists partly of an aboriginal race or races, partly of immigrants or their descendants. The aboriginal inhabitants are the American Indians or red men, being generally of a brownish-red color, and now forming a very small portion of the total population, especially in N. America, where the white population has almost exterminated them. These people are divided into branches, some of which have displayed a considerable aptitude for civilization. When the Europeans became acquainted

with the New World, Mexico, Central and part of S. America were inhabited by populations which had made great advances in many things that pertain to civilized life, dwelling in large and well-built cities under a settled form of government, and practising agriculture and the mechanical arts. Ever since the discovery of America at the close of the fifteenth century Europeans of all nations have crowded into it; and the comparatively feeble native races have rapidly diminished, or lost their distinctive features by intermixtures with whites, and also with negroes brought from Africa to work as slaves. These mixed races are distinguished by a variety of names, as Mestizos, Mulattoes, Zambos, etc. In North America the white population is mainly of British origin, though to a considerable extent it also consists of Germans, Scandinavians, and other Europeans and their descendants. In Central and South America the prevailing white nationality is the Spanish and Portuguese. In the extreme north are the Eskimos—a scattered and stunted race closely allied to some of the peoples of Northern Asia. That the aboriginal inhabitants of America passed over from Asia seems probable, but when and from what part we do not know. The total population of the New World is estimated as being 192,000,000, of which nearly two-thirds are whites, the remainder being negroes, Indians and mixed races. As regards religion the bulk of the population of N. America is Protestant; of Central and S. America the religion is almost exclusively Roman Catholic. Several millions of the Indians are heathens.—The independent States of America are all republican in form of government. See *N.*, *S.* and *Central America.*

The merit of first unlocking the American continent to modern Europe belongs to the Genoese navigator Christopher Columbus, who discovered, in October, 1492, one of the Bahamas, and named it San Salvador. The coast of North America had, however, been discovered, in the region of New England or Labrador, by the adventurous Northmen, as early as 1000, and named by them Vinland. But this discovery had no influence on the enterprise of Columbus, and did not detract in the least from his merit; forgotten in the north, it had never been known to the inhabitants of the rest of Europe. Though Columbus was the first of his time who set foot on the New World, it has taken its name not from him, but from Amerigo Vespucci. The mainland was first seen in 1497 by Sebastian Cabot, who sailed under the patronage of Henry VII of England. For further particulars of discovery see *North America* and *South America.*

The known history of America hardly goes beyond the period of its discovery by Columbus; but it possesses many monuments of antiquity that might take us many centuries backward, could we learn anything of their origin or of those by whom they were produced. Among such antiquities are great earthworks in the form of mounds, or of raised enclosures, crowning the tops of hills, river peninsulas, etc., and no doubt serving for defense. They enclose considerable areas, are surrounded by an exterior ditch, and by ramparts which are composed of mingled earth and stones, and are often of great extent in proportion to the area inclosed. They are always supplied either naturally or artificially with water, and give other indications of having been provided for a siege. Barrows and tumuli containing human bones, and which bear indications of having been used both as places of sepulture and as temples, are also numerous. They are in geometrical forms—circles, squares, parallelograms, etc. A mound on the plain of Cahokia in Illinois, opposite the city of St. Louis, is 700 feet long, 500 feet broad, and 90 feet high. Another class of earth mounds represent gigantic animal forms in bas-relief on the ground. One is a man with two heads, the body 50 feet long and 25 feet broad across the breast; another represents a serpent 1,000 feet in length, with graceful curves. The monuments of Mexico, Central America, and Peru belong to a far more advanced state of civilization, approach nearer to the historical period in origin, and make the loss of authentic information more severely felt. Here there are numerous ruined towns with most elaborate sculptures, lofty pyramidal structures serving as temples or forts, statues, picture writing, hieroglyphics, roads, aqueducts, bridges, etc. Some remarkable prehistoric remains are what are known as the abodes of the 'cliff-dwellers.' These consist of habitations constructed on terraces and in caves high up the steep sides of cañons in Colorado and other parts of the western United States. See also *Mexico*, *Peru*, etc.

America Cup, an international yachting trophy which was carried off in a Royal Yacht Squadron Contest by the United States Schooner *America* in 1851, and conveyed by deed of gift in 1857 to the New York Yacht Club. Britain challenged in 1870 and 1871, Canada in 1875 and 1881; and Britain again in 1885, 1887, 1893 and

1895. Sir Thomas Lipton made unsuccessful attempts to gain the trophy with *Shamrock I*, *Shamrock II*, and *Shamrock III* against the *Columbia* in 1899 and 1901 and against the *Reliance* in 1903. His *Shamrock IV* was defeated in 1920 by the American yacht *Resolute*. Also called AMERICA'S CUP.

American Association for the Advancement of Science, an association based on the older British society for the same purpose. It grew out of the association of American Geologists, which first met at Philadelphia in 1840, and in 1847 adopted the above title. The society meets annually in some American city, the meetings lasting a week. Valuable papers, in every field of science, are read or presented.

Americanism (a-mer'i-kän-izm), a term, phrase, or idiom peculiar to the English language as spoken in America. The following are examples:

Around or *round*, about or near. To *hang around* is to loiter about a place.

Bee, an assemblage of persons who unite their labors for the benefit of an individual or family, or carry out a joint scheme.

Bogus, false, counterfeit.

Boss, an employer or superintendent of laborers, a leader.

Buggy, a four-wheeled vehicle.

Bulldoze, to; to intimidate voters.

Bunkum or *buncombe*, a speech made solely to please a constituency; talk for talking's sake, and in an inflated style.

Calculate, to suppose, to believe, to think.

Camp-meeting, a meeting held in the fields or woods for religious purposes, and where the assemblages encamp and remain several days.

Cane-brake, a thicket of canes.

Car, a carriage or wagon of a railway train. The Englishman 'travels by rail,' or 'takes the train'; the American takes or goes by the *cars*.

Caucus, a private meeting of the leading politicians of a party to agree upon the plans to be pursued in an approaching election or in a legislative body.

Chalk: a *long chalk* means a great distance, a good deal.

Clever, good-natured, obliging.

Cocktail, a stimulating drink made of brandy or gin mixed with sugar, and a very little water.

Corn, maize; in England, wheat, or grain in general.

Corn-husking, or *corn-shucking*, an occasion on which a farmer invites his neighbors to assist him in stripping the husks from his Indian corn.

Cow-hide, a whip made of twisted strips of raw-hide.

Creek, a small river or brook; not, as in England, a small arm of the sea.

Cunning, small and pretty, nice, as it was such a *cunning* baby.

Dander: to get one's *dander raised*, to have one's *dander up*, is to have been worked into a passion.

Dead-heads, people who have free admission to entertainments, or who have the use of public conveyances, or the like, free of charge.

Dépôt, a railway-station.

Down East, in or into the New England States. A *down-easter* is a New Englander.

Drummer, a bagman or commercial traveler.

Dry goods, a general term for such articles as are sold by linen-drapers, haberdashers, hosiers, etc.

Dutch, the German language.—*Dutchman*, a German.

Fix, to; to put in order, to prepare, to adjust. To *fix* the hair, the table, the fire, is to dress the hair, lay the table, make up the fire.

Fixings, arrangements, dress, embellishments, luggage, furniture, garnishings of any kind.

Gerrymander, to arrange political divisions so that in an election one party may obtain an advantage over its opponent, even though the latter may possess a majority of votes in the State; from the deviser of such a scheme, named *Gerry*, governor of Massachusetts.

Given name, a Christian name.

Grit, courage, spirit, mettle.

Guess, to; to believe, to suppose, to think, to fancy; also used emphatically, as 'Joe, will you liquor up?' 'I *guess* I will.'

Gulch, a deep abrupt ravine, caused by the action of water.

Happen in, to; to happen to come in or call.

Help, a servant.

High-falutin, inflated speech, bombast.

Hoe-cake, a cake of Indian meal baked on a hoe or before the fire.

Indian summer, the short season of pleasant weather usually occurring about the middle of November.

Johnny cake, a cake made of Indian corn meal mixed with milk or water and sometimes a little stewed pumpkin.

Julep, a drink composed of brandy or whisky with sugar, pounded ice, and some sprigs of mint.

Loafer, a lounger, a vagabond.

Log-rolling, the assembly of several parties of wood-cutters to help one of them in rolling his logs to the river after they are felled and trimmed; also employed in politics to signify a like system of mutual co-operation.
Lot, a piece or division of land, an allotment.
Lumber timber sawed and split for use; as beams, joists, planks, staves, hoops, etc.
Lynch law, an irregular species of justice executed by the populace or a mob, without legal authority or trial.
Mail letters, to; to post letters.
Make tracks, to; to run away.
Mitten: to get the mitten is to meet with a refusal.
Mizzle, to; to abscond, or run away.
Mush, a kind of hasty-pudding.
Muss, a state of confusion.
Notions, a term applied to every variety of small-wares.
One-horse: a one-horse thing is a thing of no value or importance, a mean and trifling thing.
Picaninny, a negro child.
Pile, a quantity of money.
Planks, in a political sense, are the several principles which appertain to a party; *platform* is the collection of such principles.
Reckon, to; to suppose, to think.
Rile, to; to irritate, to drive into a passion.
Rock, a stone of any size; a pebble; as to throw *rocks* at a dog.
Rooster, the common domestic cock.
Scalawag, a scamp, a scapegrace.
Shanty, a mean structure such as squatters erect; a temporary hut.
Skedaddle, to; to run away; a word introduced during the Civil war.
Smart, often used in the sense of considerable, a good deal, as a *smart chance*.
Soft sawder, flattering, coaxing talk.
Span of horses, two horses as nearly as possible alike, harnessed side by side.
Spread-eagle style, a compound of exaggeration, bombast, mixed metaphor, etc.
Spry, active.
Stampede, the sudden flight of a crowd or number.
Store, a shop, as a book*store*, a grocery *store*.
Strike oil, to; to come upon petroleum: hence to make a lucky hit, especially financially.
Stump speech, a bombastic speech calculated to please the popular ear, such speeches in newly-settled districts being often delivered from stumps of trees.
Sun-up, sunrise.
Tall, great, fine (used by Shakespeare pretty much in the same sense); *tall talk* is extravagant talk.
Ticket: to vote the *straight ticket* is to vote for all the men or measures your party wishes.
Truck, the small produce of gardens; *truck patch*, a plot in which the smaller fruits and vegetables are raised.
Ugly, ill tempered, vicious.
Vamose, to; to run off (from the Spanish *vamos*, let us go).
Wilt, to; to become languid; lose energy.

American Legion. See *Legion*.

American Philosophical Society, Philadelphia, organized in 1744, for the promotion of useful knowledge, has had enrolled upon its list a membership without a parallel in the history of American societies. At its sesquicentennial, held May 22, 1893, delegates from 40 American and 12 European societies were in attendance, including some of the most distinguished philosophical and scientific thinkers in the world.

Americus (a-mer'i-kus), a city, county seat of Sumter county, Georgia, 72 miles S. of Macon. It is an important shipping point for cotton, live stock, fruit, nuts, foodstuffs, etc. There are fertilizer and chemical plants, syrup refineries, etc. Pop. (1920) 9015.

Amerigo Vespucci (a-mer-ē'go ves-pu̧t'c h ē), a maritime discoverer, after whom America was named; born, 1451, at Florence; died, 1512, at Seville. In 1499 he coasted along the continent of America for several hundred leagues, and the publication of his narrative, while the prior discovery of Columbus was yet comparatively a secret, led to the giving of his name to the new continent.

Ames, a city of Story county, Iowa, 37 miles N. of Des Moines, in a farming and stock-raising district. The Iowa State College of Agriculture is here; also an agricultural experiment station. Pop. (1920) 6270.

Ames, Fisher, statesman, born at Dedham, Massachusetts, in 1758; died in 1808; studied law, and became prominent in his profession—distinguished as a political orator and essayist.

Amesbury (āmz'bėr-e), a town of Massachusetts, 35 miles N. of Boston; has automobile and shoe manufactures, etc. Pop. (1920) 10,036.

Amethyst (am'e-thist), a violet-blue or purple variety of quartz, generally occurring crystallized in hexahedral prisms or pyramids, also in rolled fragments composed of imperfect

prismatic crystals. It is wrought into various articles of jewelry. The *oriental amethyst* is a rare violet-colored gem, a variety of alumina or corundum, of much brilliance and beauty.

Amhara (åm-hä'rå), a district of Abyssinia, lying between the Tacazzé and the Blue Nile.

Amherst (am'erst), a town (township) of Hampshire Co., Mass., 22 miles N. of Springfield. It is the seat of Amherst College (founded, 1821; 387 students, 50 instructors), and the Massachusetts Agricultural College (opened 1867). It has manufactures of straw hats, mercerized cotton threads, etc. Pop. (1920) 5550.

Amherst, county town of Cumberland Co., Nova Scotia, near the head of Cumberland Basin, on Bay of Fundy. It has foundries, engineering works, woodworking and piano factories, lumber mills, etc. Pop. 10,320.

Amherst, JEFFERY, LORD, born in 1717, died in 1797; distinguished British general, who fought at Dettingen and Fontenoy, and commanded in America, where he took Louisburg, Ticonderoga, and Quebec, and restored the British prestige in Canada. He was commander-in-chief in America, 1760–63, and afterwards Governor of Virginia. He was raised to the peerage, became commander-in-chief of the British armies, and ultimately field-marshal.

Amherst, WILLIAM PITT, first earl, nephew of the above; Governor-general of India, 1823; prosecuted the first Burmese war, and suppressed the Barrackpore mutiny. Born in 1773, died in 1857.

Amianthus (am-i-an'thus), a kind of flexible asbestos. See *Asbestos.*

Amice (am'is), an oblong piece of linen with an embroidered apparel sewed upon it, worn under the alb by priests of the Roman Catholic Church when engaged in the service of the mass.

Amicis, Edmondo de (dā ä-mē'-chēs), an Italian author, born at Oneglia in 1846. He studied at Cuneo, Turin and Modena; entered the Italian army and took part in the battle of Custozza, but left the service after the occupation of Rome and engaged in literature. He wrote racy and readable sketches of travel in Holland and other countries, also *La Vita Militare, Novelle* and *Ribraltc.* Died March 11, 1908.

Amide, Amine (am'id, am'in), names given to a series of salts produced by the substitution of elements or radicals for the hydrogen atoms of ammonia; often used as terminations of the names of such salts. When these hydrogen atoms are replaced by *acid* radicals, the salts are called *amides,* while if the replacing radicals are *basic,* the salts are termed *amines.*

Amiens (å-mē-an), a town of France, capital of the department of Somme, on the railway from Boulogne to Paris. It has a citadel, wide and regular streets, and several large open areas; a cathedral, one of the largest and finest Gothic buildings in Europe, founded in 1220. Having water communication with the sea by the Somme, which is navigable for small vessels, it has a large trade in cottons and woolens. The city was occupied temporarily by the Germans in their first advance on Paris in the European war (q. v.), Aug. 30, 1914, but were compelled to retire. In the last desperate offensive of the Germans in the spring of 1918 they menaced Amiens, but were unable to capture it. Pop. 78,407.

Amine (am'ēn), a compound of ammonia in which one or more atoms of hydrogen are replaced by base radicals. Thus is formed a series of amines, potassamine, ethylamine, etc.

Amirante Islands (å-mē-rån'tā), a group of eleven small islands in the Indian Ocean, lying southwest of the Seychelles, and forming a dependency of Mauritius.

Amish Church, THE. See *Mennonites.*

Amistad Case (ä-mēs-täth), a celebrated case before the United States Supreme Court in 1841. It involved the legal status of certain forcibly enslaved negroes, who by revolt had secured possession of the Spanish schooner *L'Amistad* while being transported from Havana to Puerto Principe. They landed in the United States, and the Spanish government demanded their surrender, but the demand was resisted by popular feeling in this country. The United States Circuit Court decided that the negroes had been legally justified in obtaining their freedom, and this decision was sustained by the Supreme Court.

Ammergau (åm'er-gou), a district in Upper Bavaria, having its center in the villages of Ober and Unter Ammergau. See *Passion Play.*

Ammianus (am-mi-ā'nus), MARCELLINUS, a Roman historian, born at Antioch in Syria about 320, died about 390. He wrote in thirty-one books (of which the first thirteen are lost) a history of the Cæsars, from Nerva to Valens, which was highly thought of by Gibbon for its fidelity. He was the last Latin historian of the Roman Empire.

Am'mon, an ancient Egyptian deity, one of the chief gods of the country, identified by the Greeks with their supreme god Zeus, while the Romans regarded him as the representative of Jupiter; represented as a ram, as a human being with a ram's head, or simply with the horns of a ram. There was a celebrated Temple of Ammon in the Oasis of Siwah in the Libyan desert.

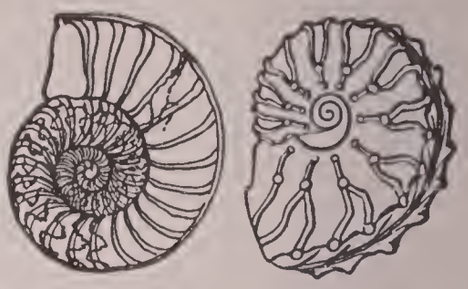
Ammon.

Ammon, Oasis of. See Siwah.

Ammonia (am-mō'ni-a), an alkaline substance, which differs from the other alkalies by being gaseous, and is hence sometimes called the *volatile alkali*. It is a colorless, pungent gas, composed of nitrogen and hydrogen. It was first procured in that state by Priestley, who termed it *alkaline air*. He obtained it from sal ammoniac by the action of lime, by which method it is yet generally prepared. It is used for many purposes, both in medicine and scientific chemistry; not, however, in the gaseous state, but frequently in solution in water, under the names of *liquid ammonia*, *ammonium hydroxide*, or *spirits of hartshorn*. It may be procured naturally from putrescent animal substances; artificially it is chiefly got from the distillation of coal and of refuse animal substances, such as bones, clippings and shavings of horn, hoof, etc. It may also be obtained from vegetable matter when nitrogen is one of its elements. Sal ammoniac is the chloride of ammonium, and was first obtained at the Temple of Ammon by distillation of camels' dung, whence the name ammonia.

Ammoniacum (a-mō-nī'a-kum), a gum-resinous exudation from an umbelliferous plant, the *Dorēma ammoniăcum*. It has a fetid smell, is inflammable, soluble in water and spirit of wine; used as an antispasmodic, stimulant, and expectorant in chronic catarrh, bronchitic affections, and asthma; also used for plasters.

Ammonite (am'on-īt), a fossil Cephalopod, belonging to the genus *Ammonītes*, allied to the Nautilus, having a many-chambered shell, in shape like the curved horns on the ancient statues of Jupiter Ammon; characteristic of the Trias, Lias, and Oolite formations, and sometimes found in immense numbers and of great size.



Ammonītes obtusus. Ammonītes varians.

Ammonites (am'on-īts), a Semitic race frequently mentioned in Scripture, descended from Ben Ammi, the son of Lot (Gen., xix, 38), often spoken of in conjunction with the Moabites. A predatory nomad race they inhabited the desert country east of Gad, their chief city being Rabbath-Ammon (Philadelphia). Wars between the Israelites and the Ammonites were frequent; they were overcome by Jephthah, Saul, David, Uzziah, Jotham, etc. They appear to have existed as a distinct people in the time of Justin Martyr, but have subsequently become merged in the aggregate of nameless Arab tribes.

Ammonium (a m-m ō'n i-u m), the name given to the hypothetical base of ammonia, analogous to an alkali metal, as potassium. It has not been isolated, but may exist in an unstable amalgam with mercury.

Ammo'nius Sac'cas, a Greek philosopher who lived about A.D. 175–250. Originally a porter in Alexandria, he derived his epithet from the carrying of *sacks* of corn. The son of Christian parents, he abandoned their faith for the polytheistic philosophy of Greece. His teaching was historically a transition stage between Platonism and Neo-Platonism. Among his disciples were Plotinus, Longinus, Origen, etc.

Ammunition (am-ū-ni'shun), military stores generally.

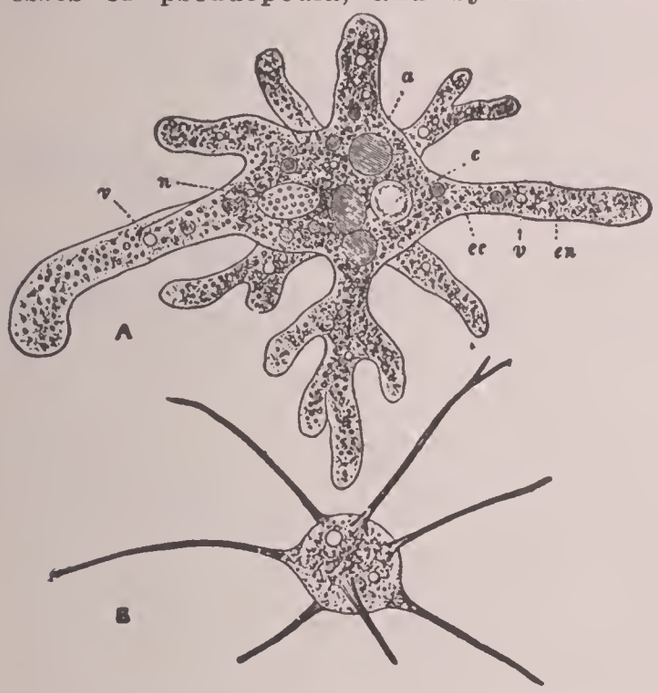
Amnesty (am'nes-ti), the releasing of a number of persons who have been guilty of political offenses from the consequence of these offenses. In the absence of specific statutes the exercise of amnesty in the United States is assumed to lie with the President, though the Supreme Court has decided that the power resides also in Congress.

Amnesty Proclamations. During the war that followed the secession of the Southern States, four important amnesty proc-

lamations were issued: one by President Lincoln in 1863, and three by President Johnson, one in 1865 and two in 1868.

Amnion (am′ni-on), the innermost membrane surrounding the fetus of mammals, birds, and reptiles.—In botany, a gelatinous fluid in which the embryo of a seed is suspended, and by which it is supposed to be nourished.

Amœba (a-mē′ba), a genus of microscopic rhizopodous Protozoa, of which *A. difflŭens*, common in fresh-water ponds and ditches, is the type. It exists as a mass of protoplasm, and pushes its body out into finger-like processes or pseudopodia, and by means of



A. *Amœba proteus*, with the pseudopodia protruded, enlarged: *n*, Nucleus; *c*, Contractile vesicle; *v*, One of the larger food-vacuoles; *en*, The granular endosarc; *ec*, The transparent ectosarc; *a*, A cell of an Alga taken in as food (other cells of the same Alga are obliquely shaded). B, *Amœba radiosa*, enlarged. The body shows two large vacuoles, but no nucleus or contractile vesicle. The long and delicate pseudopodia are protruded.

these moves about or grasps particles of food. There is no mouth and food is engulfed within any portion of the soft sarcode body. Reproduction takes place by fission, or by a single pseudopodium detching itself from the parent body and developing into a separate amœba.

Amol (ä-mol′), a town of northern Persia, 76 miles N.E. of Teheran. Extensive ruins tell of former greatness, the most prominent being the mausoleum of Seyed Quam-u-deen, who died in 1378. Pop. estimated at about 10,000.

Amomum (a-mō′mum), a genus of plants of the natural order *Zingiberaceæ* (ginger, etc.), natives of warm climates, and remarkable for the pungency and aromatic properties of their seeds. Some of the species yield cardamoms, others grains of paradise.

Amontillado (a-mon-til-a′dō), a dry kind of sherry wine of a light color, highly esteemed.

Amoo, or Am′oo-Daria, a river of Central Asia. See *Oxus*.

Amoor, or Amur (ä-moor′), one of the largest rivers of Eastern Asia, formed by the junction of the rivers Shilka and Argun; flows first in a southeastern and then in a northeastern direction till it falls into an arm of the Sea of Okhotsk, opposite the island of Saghalien, after a course of 2760 miles. Its principal tributaries are the Sungari, Usuri, Oldoi, Zeya, Kur, and Gorin. It forms, for a large portion of its course, part of the boundary-line between the Russian and the Chinese dominions, and is navigable throughout for four months in the year.—Amoor Territory. In 1858 Russia acquired from China the territory on the left bank of the Upper and Middle Amoor, together with that on both banks of the Lower Amoor. The western portion of the territory was organized as a separate province, with the name of the Amoor (area, 173,000 square miles; population 20,000). The eastern portion was joined to the Maritime Province of Eastern Siberia.

A′mor, the god of love among the Romans, equivalent to the Greek *Erōs*.

Amorgo (ä-mor′gō; ancient *Amorgos*), an island in the Grecian Archipelago, one of the Eastern Cyclades, 22 miles long, 5 miles broad; area, 106 square miles; has a town of the same name, with a castle, and a large harbor. Pop. about 3,500.

Amorites (am′or-īts), a powerful Canaanitish tribe at the time of the occupation of the country by the Israelites; occupied the whole of Gilead and Bashan, and formed two powerful kingdoms—a northern, under Og, who is called King of Bashan; and a southern, under Sihon, called King of the Amorites; first attacked and overthrown by Moses; subsequently subdued, and made tributary or driven to mingle with the Philistines and other remnants of the Canaanitish nations.

Amorphous (a-mor′fus) Rocks or Minerals, those having no regular structure, or without crystallization, even in the minutest particles.

Amorphozoa (a-mor-fō-zō′a), a term applied to some of the lower groups of animals, as the sponges and their allies, which have no regular symmetrical structure.

Amortization (a-mor-ti-zā'shun), in law, the alienation of real property to corporations (that is, in *mortmain*), prohibited by several English statutes.

Amos (ā'mos), one of the minor prophets; flourished under the kings Uzziah and Judah and Jeroboam II of Israel (B.C. 810 to 784 by the common chronology). Though engaged in the occupations of a peasant, he must have had a considerable amount of culture, and his book of prophecies has high literary merits. It contains denunciations of Israel and the surrounding nations, with promises of the Messiah.

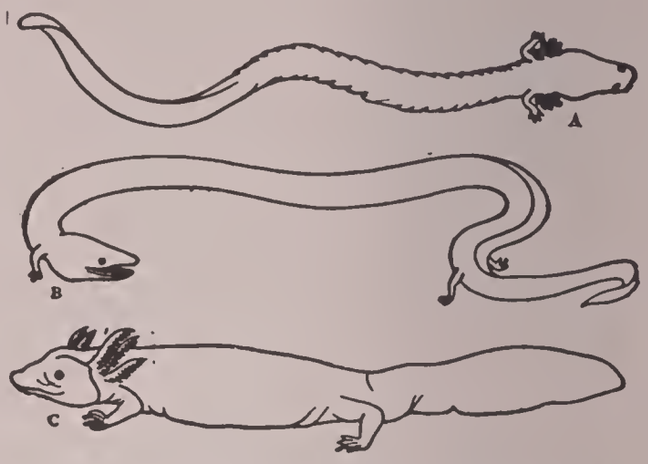
Amoy (ä-moi'), an important Chinese trading port, on a small island off the southeast coast opposite Formosa; has a safe and commodious harbor, and its merchants are among the wealthiest and most enterprising in China; one of the five ports opened to British commerce in 1842, now open to all countries. Pop. 114,000.

Ampelidæ (am-pel'i-dē). See *Chatterers.*

Ampère (äṇ-pār), ANDRÉ MARIE, a French mathematician and founder of the science of electrodynamics, born 1775; died 1836; professor of mathematics at the Polytechnic School and of physics at the College of France. What is known as *Ampère's Theory* is that magnetism consists in the existence of electric currents circulating round the particles of magnetic bodies, being in different directions round different particles when the bodies are unmagnetized, but all in the same direction when they are magnetized. His name has been given to the unit used in measuring the electric current.

Ampère, JEAN JACQUES ANTOINE, an eminent historian and professor of French literature in the College of France; the only son of André-Marie Ampère; born at Lyons 1800, died 1864; chief works *Histoire Littéraire de la France avant la 12° siècle* (1839); *Introduction à l'Histoire de la Littérature française au moyen-âge* (1841); *Littérature, Voyages et Poésies* (1833); *La Grèce, Rome et Dante, Etudes Littéraires d'après Nature; l'Histoire romaine à Rome,* four vols. 8vo (1856–64).

Amphibia (am-fib'i-a), a class of vertebrate animals, which in their early life breathe by gills or branchiæ, and afterwards *partly* or *entirely* by lungs. The Frog, breathing in its tadpole state by gills and afterwards throwing off these organs and breathing entirely by lungs in its adult state, is an example of the latter phase of amphibian existence. The Proteus of the underground caves of Central Europe exemplifies forms in which the gills of early life are retained throughout life, and in



Tailed Amphibians. a, *Siren lacertina;* b, *Amphiuma,* showing the four minute limbs; c, *Menobranchus maculatus.* (After Mivart.)

which lungs are developed in addition to the gills. A second character of this group consists in the presence of two occipital 'condyles,' or processes by means of which the skull articulates with the spine or vertebral column; reptiles possessing one condyle only. The class is divided into four orders: the Ophiomorpha (or serpentiform), represented by the Blindworms, in which limbs are wanting and the body is snake-like; the Urodela or 'Tailed' Amphibians, including the Newts, Proteus, Siren, etc.; the Anoura, or Tailless Amphibia, represented by the Frogs and Toads; and the Labyrinthodontia, which includes the extinct forms known as Labyrinthodons. See *Batrachia.*

Amphictyonic (am-fik-ti-on'-ik) LEAGUE (or COUNCIL), in ancient Greece, a confederation of tribes for the protections of religious worship, but which also discussed questions of international law and matters affecting their political union. The most important was that of the twelve northern tribes which met alternately at Delphi and Thermopylæ. The tribes sent two deputies each, who assembled with great solemnity; composed the public dissensions, and the quarrels of individual cities, by force or persuasion; punished civil and criminal offenses, and particularly transgressions of the law of nations, and violations of the temple of Delphi. Its calling on the States to punish the Phocians for plundering Delphi caused the Sacred wars, 595–586, 448–447, 357–346 B. C.

Amphion (am-fī'on), in Greek mythology, son of Zeus and

Antiŏpē, and husband of Niŏbē; had miraculous skill in music, being taught by Mercury, or, according to others, by Apollo. In poetic legend he is said to have availed himself of his skill when building the walls of Thebes—the stones moving and arranging themselves in proper position at the sound of his lyre.

Amphioxus (am-fi-ok'sus). See *Lancelet.*

Amphipoda (am-fip'ō-da), an order of sessile-eyed malacostracan crustaceans, with feet directed partly

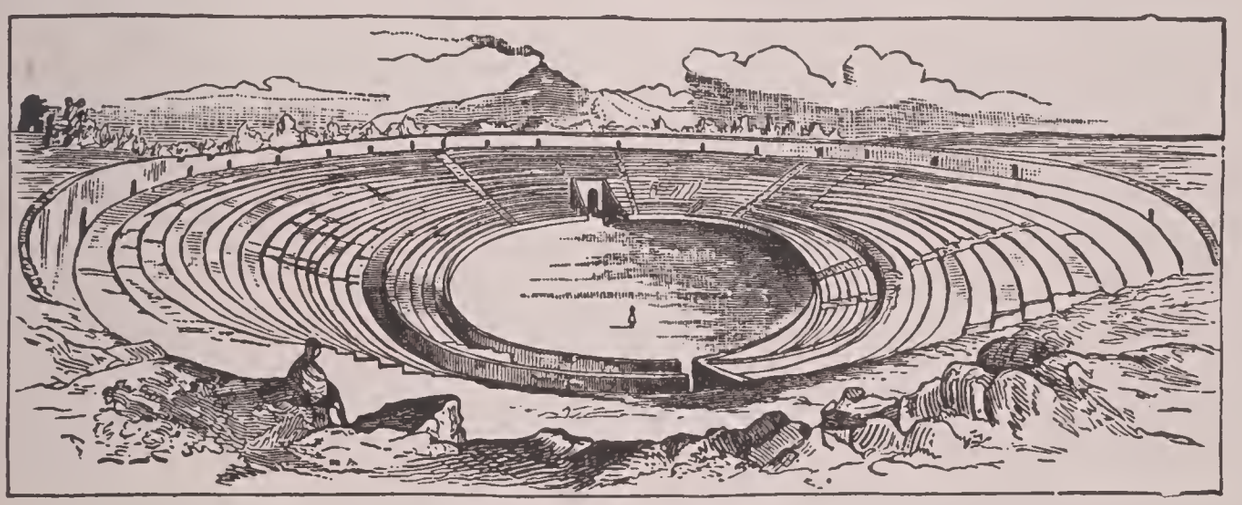
Amphipoda.—1, Shore-jumper (*Orchestia littoralis*). 2, Portion showing the respiratory organs *a a a.*

forwards and partly backwards. Many species are found in springs and rivulets; others in salt water. The sand-hopper and shore-jumper are examples.

ants and earthworms, and were formerly but erroneously deemed poisonous.

Amphiscii (am-fis'i-ī; Gr. *amphi*, on both sides, and *skia*, shadow), a term sometimes applied to the inhabitants of the intertropical regions, whose shadows at noon in one part of the year are cast to the north and in the other to the south, according as the sun is in the southern or northern signs.

Amphitheater (am-fi-the'a-tėr), an ancient Roman edifice of an oval form without a roof, having a central area (the *arena*) encompassed with rows of seats, rising higher as they receded from the center, on which people used to sit to view the combats of gladiators and of wild beasts, and other sports. The Colosseum at Rome was the largest of all the ancient amphitheaters, being capable of containing from 50,000 to 80,000 persons. That at Verona is one of the best examples remaining. Its dimensions are 502 feet by 401, and 98 feet high. The name means 'both-ways theater,' or 'theater all round,' the theater forming only a semicircular edifice.



Amphitheater at Pompeii.

Amphiprostyle (am-fip'ro-stīl), in architecture, said of a structure having the form of an ancient Greek or Roman oblong rectangular temple, with a prostyle or portico on each of its ends or fronts, but with no columns on its sides or flanks.

Amphisbæna (am-fis-bē'na; Gr. from *amphis*, both ways, and *bainō*, to go), a genus of serpentiform, limbless, lacertilian reptiles; body cylindrical, destitute of scales, and divided into numerous annular segments; the tail obtuse, and scarcely to be distinguished from the head, whence the belief that it moved equally well with either end foremost. There are several species, found in tropical America. They feed on

Amphitrite (am-fi-trī'tē), in Greek mythology, daughter of Oceanus and Tethys, or of Nereus and Doris, and wife of Poseidon (or Neptune), represented as drawn in a chariot of shells by Tritons, with a trident in her hand.

Amphitryon (am-fīt'ri-un), in Greek legend, King of Tiryns, son of Alcæus, and husband of Alcmena. Plautus, and after him Molière, have made an amour of Zeus with Alcmena the subject of amusing comedies.

Amphiuma (am-fi-ū'ma), a genus of amphibians which frequent the lakes and stagnant waters of North America. The adults retain the

clefts at which the gills of the tadpole projected.

Amphora (am'fō-ra), a vessel used by the Greeks and Romans for holding liquids; commonly tall and narrow, with two handles and a pointed end

Filling an Amphora.

which fitted into a stand or was stuck in the ground to enable them to stand upright; also as a cinerary urn, and as a liquid measure,—Gr. = 9 gallons; Rom. = 6 gallons.

Amplexicaul (am-plek'si-kạl), in botany, said of a leaf that embraces and nearly surrounds the stem.

Amplitude (am'pli-tūd), in astronomy, the distance of any celestial body (when referred by a secondary circle to the horizon) from the east or west points.

Ampulla (am-pul'a), in antiquity, a vessel bellying out like a jug, that contained unguents for the bath; also a vessel for drinking at table. The ampulla has also been employed for ceremonial purposes, such as holding the oil or chrism used in various church rites and for anointing monarchs at their coronation. The ampulla of the English sovereigns now in use is in the shape of an eagle. The most celebrated ampulla was that of St. Remy, from which the French kings were anointed.

Amputation (am-pu-tā'shun), in surgery, that operation by which a member is separated from the body according to the rules of the science.

Amraoti (äm-ra-ō'tē), a town of British India in Berár; it is celebrated for its cotton, and is a place of good trade. Pop. about 38,000. Also a district of the same name.

Amritsir, or AMRITSAR (um'rit-sar; 'the pool of immortality'), a flourishing commercial town of Hindustan, capital of a district of the same name, in the Punjab, the principal place of the religious worship of the Sikhs. It has considerable manufactures of shawls and silks; and receives its name from the sacred pond constructed by Ram Das, the apostle of the Sikhs, in which the Sikhs and other Hindus immerse themselves that they may be purified from all sin. Pop. 152,756.

Amru (am'rū), originally an opponent and subsequently a zealous supporter of Mohammed and one of the ablest of the Mohammedan warriors. He brought Egypt under the power of the Caliph Omar in 638, and governed it wisely till his death in 663. The burning of the famous Alexandrian Library has been generally attributed to him, though only on the authority of a writer who lived six centuries later.

Amsterdam (am'stėr-dam; that is, 'the dam of the Amstel'), one of the chief commercial cities of Europe, capital of Holland, situated at the confluence of the Amstel with the Y or Ij (prounounced as *eye*), an arm of the Zuider Zee. On account of the lowness of the site of the city, the greater part of it is built on piles. It is laid out in the form of a crescent and divided by numerous canals into about 100 islands, connected by over 300 bridges. Many of the streets have a canal in the middle with broad brick-paved quays on either side, planted with rows of trees; the houses are generally of brick, many of them six or seven stories

high, with pointed gables turned to the streets. Among the public buildings are the old stadthouse, now a royal palace, the interior of which is decorated by the Dutch painters and sculptors of the seventeenth century with their master-

pieces; the Nieuwe Kerk (1408), where the sovereigns of Holland are crowned; the Oude Kerk (1300); the Ryks Museum; the exchange; and the Palace of National Industry. Among its numerous industries may be mentioned as a specialty the cutting and polishing of diamonds. The harbor, formed by the Y, lies along the whole of the north side of the city, and is surrounded by various docks and basins. The trade is very great, being much facilitated by the great ship-canal (15 m. long), connecting the Y directly with the North Sea. Population 587,872.

Amsterdam, a city of Montgomery county, New York, on the Mohawk River, 33 miles N. W. of Albany. It has extensive carpet and rug

Amsterdam—Scene on the Amstel

factories. Other products are knit goods, brooms, pearl buttons, etc. It is on the Barge Canal and N. Y. Central R. R. Pop. (1910) 31,267; (1920) 33,524.

Amsterdam Island, a small island in the Indian Ocean, midway between Tasmania and the Cape. It belongs to France, with the island of St. Paul.

Amu. See *Amoo, Oxus.*

Amuck. AMUK, to RUN, a phrase applied to natives of the Eastern Archipelago who are occasionally seen to rush out in a frantic state, making indiscriminate and murderous assaults on all that come in their way.

Amulet (am′ū-let), a piece of stone, metal, etc., marked with certain figures or characters, which people in some countries wear as a protection against diseases and enchantments.

Amundsen (a′mund-sen), ROALD, an Arctic explorer, born at Borje, Norway, in 1872; became a lieutenant in the navy. He joined the *Belgica* expedition to the Antarctic seas, 1897-99, and left Christiania in 1903 for the Arctic seas. After two years' search he succeeded in locating the north magnetic pole, in King William's land. He then carried his little vessel, the *Gjoa*, to Bering Strait, reaching there in 1906, and being thus the first to navigate the northwest passage from the Atlantic to the Pacific. It had been traversed by Robert McClure in 1851, but only partly by ship. In 1910 he projected a voyage to the Arctic Sea, but changed his plan and sailed to the Antarctic, where, on December 14, 1911, he succeeded in reaching the South Pole.

Amur. See *Amoor.*

Amurath (ä-mū-rät′) or MURAD, the name of several Ottoman sultans. See *Ottoman Empire.*

Amygdaloid (a-mig′da-loid; Gr. *amygdalē*, an almond), a term applied to an igneous rock, especially trap, containing round or al-

mond-shaped vesicles or cavities partly or wholly filled with crystalline nodules of various minerals, particularly calcareous spar, quartz, agate, zeolite, chlorite, etc.

Amyl (am'il), in chemistry, a hydrocarbon radical believed to exist in many compounds, especially the fusel-oil series, and having the formula C_5H_{11}—*Amyl Nitrite*, or *Nitrite of Amyl*, an amber-colored fluid, smelling and tasting like essence of pears, which has been employed as an anæsthetic and also in relieving cardiac distress, as in angina pectoris. It is also used in epilepsy, asthma, tetanus, etc., and is usually inhaled, causing severe but temporary distress.

Amylene (am'i-lēn), an ethereal liquid with an aromatic odor, prepared from fusel-oil (C_5H_{10}). It possesses anæsthetic properties, and has been tried as a substitute for chloroform, but is very dangerous.

Amylic (a-mil'ik) ALCOHOL, one of the products of the fermentation of grain, etc., commonly known by the name of fusel-oil (which see).

Amyloid (am'i-loid), is a term equivalent to 'starchy.' Amyloids are substances like starch, sugar, gum, etc., composed of carbon, hydrogen, and oxygen, the latter two in the proportions found in water. They occur largely in plants, and the animal body is a mixture of proteids, fats, and amyloids, or carbohydrates.

Amyridaceæ (a-mir-i-dā'ce-ē), a natural order of plants, consisting of tropical trees or shrubs, the leaves, bark, and fruit of which abound in fragrant resinous and balsamic juices. Myrrh, frankincense, and the gum-elemi of commerce are among their products. Among the chief genera of the order are *Amyris*, *Balsamodendron*, *Boswellia*, and *Canarium*.

Ana (a'na, ā'na), the neuter plural termination of Latin adjectives in *ānus*, often forming an affix with the names of eminent men to denote a collection of their memorable sayings—thus *Scaligeriana*, *Johnsoniana*, the sayings of Scaliger, of Johnson; or to denote a collection of anecdotes, or gossipy matter, as in *boxiana*. Hence, as an independent noun, books recording such sayings; the sayings themselves.

Anabaptists (an-a-bap'tists; from the Greek *anabaptizein*, to rebaptize), a name given to a Christian sect by their adversaries, because, as they objected to infant baptism, they rebaptized those who joined their body. The founder of the sect appears to have been Nicolas Storch, a disciple of Luther, who seems to have aimed also at the reorganization of society based on civil and political equality. Gathering round him a number of fiery spirits, among whom was Thomas Münzer, he incited the peasantry of Suabia and Franconia to insurrection—the doctrine of a community of goods being now added to their creed. This insurrection was quelled in 1525, when Münzer was put to the torture and beheaded. After the death of Münzer the sectaries dispersed in all directions, spreading their doctrines wherever they went. In 1534 the town of Münster in Westphalia became their center of action. Under the leadership of Bockhold and Matthias their numbers increased daily, and being joined by the restless spirits of the adjoining towns they soon made themselves masters of the town and expelled their adversaries. Matthias became their prophet, but he fell in a sally against the Bishop of Münster, Count Waldeck, who had laid siege to the city. Bockhold then became leader, assuming the name of John of Leyden, King of the New Jerusalem, and Münster became a theater of all the excesses of fanaticism, lust, and cruelty. The town was eventually taken (June, 1535), and Bockhold and a great many of his partisans suffered death. This was the last time that the movement assumed anything like political importance. In the meantime some of the apostles, who were sent out by Bockhold to extend the limits of his kingdom, had been successful in various places, and many independent teachers, who preached the same doctrines, continued active in the work of founding a new empire of pure Christians. They rejected the practice of polygamy, community of goods, and intolerance towards those of different opinions which had prevailed in Münster; but they enjoined upon their adherents the other doctrines of the early Anabaptists, and certain heretical opinions in regard to the humanity of Christ, occasioned by the controversies of that day about the sacrament. The application of the term Anabaptist to the general body of Baptists throughout the world is unwarranted, the Baptists repudiating the name, as they claim to baptize according to the original institution of the rite, and never repeat baptism in the case of those who in their opinion have been so baptized.

Anabas (an'a-bas). See *Climbing-Perch*.

Anabasis (a-nab'a-sis, 'a going up'), the Greek title of Xenophon's celebrated account of the expedition of Cyrus the Younger against his brother Artaxerxes, King of Persia. The title is

also given to Arrian's work which records the campaigns of Alexander the Great.

Anableps (an'a-bleps), a genus of fishes of the perch family, found in the rivers of Guiana, consisting of but one species, remarkable for a peculiar structure of the eyes, in which there is a division of the iris and cornea, by transverse ligaments forming two pupils, and making the whole eye appear double. This genus belongs to the ovoviviparous fishes.

Anabolism (an-ab'ō-lizm), a term indicating the constructive processes which go on within the protoplasm of animal bodies, by which the food materials, beginning at a low level in organic chemistry, pass through an ascending series of growing complexity until fully converted into living matter.

Anacanthini (an-a-kan-thī'nī; Gr. neg. prefix *an*, and *akantha*, a spine), an order of osseous fishes, including the cod, plaice, whiting and other edible species, with spineless fins, the ventral fins absent or below the pectorals, and ductless swim-bladder.

Anacardiaceæ (an-a-kar-di-ā'se-ē), a natural order of plants, consisting of tropical trees and shrubs which secrete an acrid resinous juice, which is often used as a varnish. Mastic, Japan lacquer, and Martaban varnish are some of their products. The cashoo or cashew (genus *Anacardium*), the pistacia, sumach, mango, etc., are members of the order.

Anacharis (a-nak'a-ris), a genus of plants, nat. order Hydrocharidaceæ, the species of which grow in ponds and streams of fresh water; water-thyme or water-weed. *A. Alsinastrum* has been introduced from North America into European (including British) rivers, canals, and ponds, and by its rapid growth in dense tangled masses tends to choke them so as materially to impede navigation.

Anachronism (an-ak'ron-izm), an error of chronology by which things are represented as coexisting which did not coexist; applied also to anything foreign to or out of keeping with a specified time. Thus it is an anachronism when Shakespere, in *Troilus and Cressida*, makes Hector quote Aristotle.

Anaconda (an-a-kon'da), the popular name of two of the largest species of the serpent tribe, viz., a Ceylonese species of the genus Python (*P. tigris*), said to have been met with 33 feet long; and *Eunectes murinus*, a native of tropical America, allied to the boa-constrictor, and the largest of the serpent tribe, attaining the length of 40 feet.

Anaconda, a city, capital of Deer Lodge county, Montana, the center of an active copper and silver mining district. It has the largest copper smelting and refining plant in the world. Pop. (1920) 11,668.

Anacortes (an-a-kor'tes), a city of Skagit Co., Wash., on Puget Sound, 15 miles S. W. of Bellingham, on Gt. Northern R. R.; port of call for Sound steamers. It has fish canneries, lumber mills, etc. Pop. (1920) 5284.

Anacreon (a-nak're-on), an amatory lyric Greek poet of the sixth century B. C., native of Teos, in Ionia. Only a few fragments of his works have come down to us. The Odes attributed to him are spurious.

Anadyomene (an-a-di-om'e-nē; Greek, 'rising,' especially, 'out of the sea'), a name given to Aphrodite (Venus) when rising from the sea, as in the celebrated painting by Apelles.

Anadyr (ä-nä'dēr), the most easterly of the larger rivers of Siberia and of all Asia; rises in the Stanovoi Mountains, and falls into the Gulf of Anadyr; length, 460 miles.

Anæmia (a-nē'mi-a; Greek, 'want of blood'), a medical term applied to an unhealthy condition of the body, in which there is a diminution of the red corpuscles which the blood should contain. The principal symptoms are paleness and general want of color in the skin, languor, emaciation, want of appetite, fainting, etc. See *Leukemia*.

Anæsthesia (an-es-thē'zi-a), ANÆSTHESIS, a state of insensibility to pain, produced by inhaling chloroform, ether, etc., or by the hypodermic injection of other anæsthetic agents. Stovaine and cocaine have been injected into the spinal column for anæsthesia, causing loss of sensation below the injecting point. Cocaine is valuable for local anæsthesia.

Anæsthetics (an-es-thet'iks), medical agents employed for the production of insensibility, especially during surgical operations. Various agents have been employed for this purpose from the earliest times, but the scientific use of anæsthetics may be said to date from 1800, when Sir Humphry Davy made experiments on the anæsthetic properties of nitrous oxide, and recommended its use in surgery. In 1818 Faraday established the anæsthetic properties of sulphuric ether, but this agent made no advance beyond the region of experiment, till 1844, when Dr. Wells, a dentist of Hartford, Connecticut, ap-

plied the inhalation of nitrous oxide in the extraction of teeth, but owing to some misadventure did not persevere with it. He was followed in 1846 by Dr. W. T. G. Morton, a Boston dentist, who first employed ether in dentistry and extended its use to other surgical operations. In 1847 Sir James Simpson made the first application of ether in a case of midwifery. Towards the end of the same year Simpson had his attention called to the anæsthetic efficacy of chloroform, and announced it as a superior agent to ether. This agent has since been the most extensively used anæsthetic, though the use of ether still largely prevails in the United States. In their general effects ether and chloroform are very similar; but the latter tends to enfeeble the action of the heart more readily than the former. For this reason great caution has to be used in administering chloroform where there is weak heart action from disease. Local anæsthesia is produced by isolating the part of the body to be operated upon, and producing insensibility of the nerves in that locality. Dr. Richardson's method is to apply the spray of ether, which, by its rapid evaporation, chills and freezes the tissues and produces complete anæsthesia. Ether was first used as an anæsthetic by Dr. Crawford W. Long, of Danielsville, Georgia. Cocaine is the most valuable of local anæsthetics.

Anagallis (an-a-gal'is). See *Pimpernel.*

Anagni (å-nän'yē), a town of Italy, province of Rome; the seat of a bishopric erected in 487. Pop. 10,059.

Anagram (an'a-gram), the transposition of the letters of a word or words so as to form a new word or phrase, a connection in meaning being frequently preserved; thus, *evil, vile; Horatio Nelson, Honor est a Nilo* (honor is from the Nile).

Anaheim (an'a-hīm), a city of Orange county, California, 25 miles S. E. of Los Angeles, in a fruit and grain region. It has canneries and manufactures of farm machinery, etc. Pop. 5526.

Anahuac (å-nå-wåk'; Mexican, 'near the water'), an old Mexican name applied to the plateau of the city of Mexico, from the lakes situated there, generally elevated from 6000 to 9000 feet above the sea.

Anakim (an'a-kim), the posterity of Anak, the son of Arba, noted in sacred history for their fierceness and loftiness of stature. Their stronghold was Kirjath-arba or Hebron.

Analogue (an'a-log), in comparative anatomy an organ in one species or group having the same function as an organ of different structure in another species or group, as the wing of a bird and that of an insect, both serving for flight. Organs in different animals having a similar anatomical structure, development, and relative position, independent of function or form, such as the arm of a man and the wing of a bird, are termed *homologues.*

Analogy (an-al'ō-ji), is the mode of reasoning from resemblance to resemblance. When we find on attentive examination resemblances in objects apparently diverse, and in which at first no such resemblances were discovered, a presumption arises that other resemblances may be found by further examination in these or other objects likewise apparently diverse. It is on the belief in a unity in nature that all inferences from analogy rest. The general inference from analogy is always perfectly valid. Wherever there is resemblance, similarity or identity of cause somewhere may be justly inferred; but to infer the particular cause without particular proof is always to reason falsely. Analogy is of great use and constant application in science, in philosophy, and in the common business of life.

Analysis (an-al'i-sis), the resolution of an object, whether of the senses or the intellect, into its component elements. In philosophy it is the mode of resolving a compound idea into its simple parts, in order to consider them more distinctly, and arrive at a more precise knowledge of the whole. It is opposed to *synthesis*, by which we combine and class our perceptions, and contrive expressions for our thoughts, so as to represent their several divisions, classes and relations.

Analysis, in mathematics, is, in the widest sense, the expression and development of the functions of quantities by calculation; in a narrower sense the resolving of problems by algebraic equations. The analysis of the ancients was exhibited only in geometry, and made use only of geometrical assistance, whereby it is distinguished from the analysis of the moderns, which extends to all measurable objects, and expresses in equations the mutual dependence of magnitudes. Analysis is divided into lower and higher, the lower comprising, besides arithmetic and algebra, the doctrines of functions, of series, combinations, logarithms, and curves, the higher comprising the differential and integral calculus, and the calculus of variations.

In chemistry, analysis is the process of decomposing a compound substance with a view to determine either (*a*) what ele-

ments it contains (*qualitative analysis*), or (*b*) how much of each element is present (*quantitative analysis*). Thus by the first process we learn that water is a compound of hydrogen and oxygen, and by the second that it consists of one part of hydrogen by weight to eight parts of oxygen.

Anam (a-nam′), a country of Asia occupying the E. side of the Southeastern or Indo-Chinese Peninsula, along the China Sea, having a length of about 850 miles, with a breadth varying from over 400 miles in the N. to 100 in the middle. It is composed of three parts: Tonquin in the N.; Cochin-China in the S.; and the territory of the Laos tribes, S. W. of Tonquin (together, area, 170,000 square miles, pop. 15,000,000, 9,000,000 being in Tonquin). The coast is considerably indented, especially at the mouths of the rivers, where it affords many commodious harbors. Tonquin is mountainous on the north, but in the east is nearly level, terminating towards the sea in an alluvial plain yielding good crops of rice, cotton, fruits, ginger, and spices, and a great variety of varnish-trees, palms, etc. The principal river is the Song-ka, which has numerous tributaries, many of them being joined together by canals, both for irrigation and commerce. Tonquin is rich in gold, silver, copper, and iron. Cochin-China is, generally speaking, unproductive, but contains many fertile spots, in which grain, leguminous plants, sugar-cane, cinnamon, etc., are produced in great abundance. Agriculture is the chief occupation, but many of the inhabitants are engaged in the spinning and weaving of cotton and silk into coarse fabrics, the preparation of varnish, iron-smelting, and the construction of ships or junks. The inhabitants are said to be the ugliest of the Mongoloid races of the peninsula, being under the middle size and less robust than the surrounding peoples. Their language is monosyllabic, and is connected with the Chinese. The religion of the majority is Buddhism, but the educated classes hold the doctrines of Confucius. The principal towns are Hanoi, the capital of Tonquin, and Huë, the capital of Cochin-China and formerly of the whole empire. Anam was conquered by the Chinese in 214 B.C., but in 1428 A.D. it completely won its independence. The French began to interfere actively in its affairs in 1847 on the plea of protecting the native Christians. By the treaties of 1862 and 1867 they obtained the southern and most productive part of Cochin-China, subsequently known as French Cochin-China; and in 1874 they obtained large powers over Tonquin, notwithstanding the protests of the Chinese. Finally, in 1883 Tonquin was ceded to France, and next year Anam was declared a French protectorate. As now constituted, Anam forms the central district of French Indo-China, between Tonquin and Cochin-China. Area 52,110 sq. miles; pop. 5,542,882.

Anamorphosis (an-a-mor′fō-sis), a term denoting a drawing executed in such a manner as to present a distorted image of the object represented, but which, when viewed from a certain point, or reflected by a curved mirror or through a polyhedron, shows the object in its true proportions.

Ananas. See *Pine-apple.*

Anapa (än-ä-pä), an important seaport and fortified town in Russian Circassia, on the Black Sea, a station of the Russian navy. Pop. 6676.

Anapæst (an′a-pest), in prosody, a foot consisting of two short and one long syllable, or two unaccented and one accented syllable.

Anaphylaxis (an-a-fi-lak′sis), the word employed by Charles Richet, Professor of Physiology at the University of Paris, to designate the quality which certain poisons possess of increasing instead of diminishing the sensitiveness of an organism to their action. The Nobel Prize in medicine for 1913 was given to Professor Richet for his discoveries in anaphylaxis.

Anaplasty (an′a-plas-ti), a surgical operation to repair superficial lesions, or solutions of continuity, by the employment of adjacent healthy structure. Artificial noses, etc., are thus made.

Anarajapura (ån-å-rå-jä-pu′rå), or ANURADHPURA, a ruined city, the ancient capital of Ceylon, built about 540 B.C., and said to have covered an area of 300 square miles, doubtless an exaggeration. There are still several dagobas in tolerable preservation, but the great object of interest, the sacred Bo-tree, which lived over 2000 years, was shattered by a storm in 1887.

Anarchists (an′ar-kists), the name applied to those who advocate a society without government. Harmony in such a society would be obtained by free agreements between various groups for the sake of production, consumption, etc. Man in such a society, it is maintained, would react the full individualization not possible either under the present system of capitalist monopoly or under state socialism. The strongest exponent of anarchism in ancient Greece was Zeno, who opposed the state Utopia of Plato. Rabelais and Fénelon expressed

anarchistic ideas, as did the French Encyclopedists and Revolutionists; but it was William Goodwin who first formulated the political and economic conceptions of anarchism, though he did not use the name anarchism. The term was first applied to the society without government by Proudhon in 1840.

Anarthropoda (an-ar-throp'o-da), one of the two great divisions (the *Arthropoda* being the other) of the *Annulosa*, or ringed animals, in which there are no articulated appendages. It includes the leeches, earthworms, tube-worms, etc.

Anas (a'nas), a widely distributed genus of web-footed birds, containing the true ducks.

Anasarca (an-a-sar'ka). See *Dropsy*.

Anastasius I (an-as-tā'she-us), Emperor of the East, succeeded Zeno, A.D. 491, at the age of sixty. He was a member of the imperial lifeguard, and owed his elevation to Ariadne, widow of Zeno, whom he married. He gained the popular favor by a judicious remission of taxation, and displayed great vigor in administering the affairs of the empire. He carried on wars with the Persians and with the supporters of Longinus, the brother of Zeno; strengthened the fortifications of Constantinople, and effected other improvements. Died 518.

Anastatica (an-a-stat'ika), a genus of cruciferous plants, including the Rose of Jericho (*A. hierochuntica*). See *Rose of Jericho*.

Anastatic Printing, a mode of obtaining facsimile impressions of any printed page or engraving by transferring it to a plate of zinc, which, on being subjected to the action of an acid, is etched or eaten away with the exception of the parts covered with the ink, which parts, being thus protected from the action of the acid, are left in relief so that they can readily be printed from.

Anastomosis (an-as-to-mō'sis), in animals and plants, the inosculation of vessels, or the opening of one vessel into another, as an artery into another artery, or a vein into a vein. By means of anastomosis, if the course of a fluid is arrested in one vessel it can proceed along others. It is by anastomosis that circulation is reëstablished in amputated limbs, and in those cases of aneurism of various kinds when the vessel is tied.

Anathema (a-nath'e-ma), originally a gift hung up in a temple (Greek *anatithēmi*, 'to set up'), and dedicated to some god, a votive offering; but it gradually came to be used for *expulsion, curse*. The Roman Catholic Church pronounces the sentence of anathema against heretics, schismatics, and all who wilfully pursue a course of conduct condemned by the church. The subject of the anathema is declared an outcast from the church, all the faithful are forbidden to associate with him, and utter destruction is pronounced against him, both body and soul.

Anatidæ (a-nat'i-dē), a family of swimming birds, including the ducks, swans, geese, etc.

Anatolia (an-a-tō'li-a; from Gr. *anatolē*, the sunrise, the Orient), the modern name of Asia Minor. See *Asia Minor*.

Anatomy (a-nat'o-mi), in the literal sense, means simply a cutting up, but is now generally applied both to the art of dissecting or artificially separating the different parts of an organized body (vegetable or animal) with a view to discover their situation, structure, and economy; and to the science which treats of the internal structure of organized bodies. The branch which treats of the structure of plants is called *vegetable anatomy* or *phytotomy*, and that which treats of the structure of animals *animal anatomy* or *zoötomy*, a special branch of the latter being *human anatomy* or *anthropotomy*. *Comparative anatomy* is the science which compares the anatomy of different classes or species of animals, as that of man with quadrupeds, or that of quadrupeds with fishes; while *special anatomy* treats of the construction, form, and structure of parts in a single animal. The special anatomy of an animal may be studied from various standpoints; with relation to the succession of forms which it exhibits from its first stage to its adult form (*developmental* or *embryotical anatomy*), with reference to the general properties and structure of the tissues or textures (*general anatomy, histology*), with reference to the changes in structure of organs or parts produced by disease and congenital malformations (*morbid* or *pathological anatomy*); with reference to the function, use, or purpose performed by the organs or parts (*teleological* or *physiological anatomy*). According to the parts of the body described, the different divisions of human anatomy receive different names; as, *osteology*, the description of the bones; *myology*, of the muscles; *desmology*, of the ligaments and sinews; *splanchnology*, of the viscera or internal organs, in which are reckoned the lungs, stomach, and intestines, the liver, spleen, kidneys, bladder, pancreas, etc. *Angiology* describes the vessels through which the

liquids in the body are conducted, including the blood-vessels, which are divided into arteries and veins, and the lymphatic vessels, some of which absorb matters from the bowels, while others are distributed through the whole body, collecting juices from the tissues and carrying them back into the blood. *Neurology* describes the system of the nerves and of the brain; *dermatology* treats of the skin.—Among anatomical labors are particularly to be mentioned the making and preserving of anatomical preparations. Preparations of this sort can be preserved (1) by drying them and clearing away all muscular adhesions, etc., as is done with skeletons, the bones of which are sometimes washed with acids to give firmness and whiteness: (2) by putting them into liquids as alcohol, spirits of turpentine, etc., as is done with the intestines and other soft parts of the body; (3) by injection, which is used with vessels, the course and distribution of which are to be made sensible and the shape of which is to be retained; (4) by tanning and covering with a suitable varnish, as the muscles.

Among the ancient writers or authorities on human anatomy may be mentioned Hippocrates the younger (460–377 B.C.), Aristotle (384–322 B.C.), Herophilus and Erasistratus of Alexandria (fl. about 300 B.C.), Celsus (53 B.C.–37 A.D.), and Galen of Pergamus (140–200), the most celebrated of all the ancient authorities on the science. From his time till the revival of learning in Europe in the fourteenth century anatomy was checked in its progress. In 1315 Mondino, professor at Bologna, first publicly performed dissection, and published a *System of Anatomy*, which was a text-book in the schools of Italy for about 200 years. In the sixteenth century Fallopio of Padua, Eustachi of Venice, Vesalius of Brussels, Varoli of Bologna, and many others, enriched anatomy with new discoveries. In the seventeenth century Harvey discovered the circulation of the blood, Asellius discovered the manner in which the nutritious part of the food is conveyed into the circulation, while the lymphatic system was detected and described by the Dane T. Bartholin. Among the renowned anatomists of later times we can only mention Malpighi, Boerhaave, William and John Hunter, the younger Meckel, Bichât, Rosenmüller, Quain, Sir A. Cooper, Sir C. Bell, Carus, Joh. Müller, Häckel, Gegenbaur, Owen, Huxley, Gray and Leidy. For the purpose of aiding anatomical study, a statute was passed in England in 1832 which made provision for the wants of surgeons, and students, by permitting, under certain regulations, the dissection of the bodies of persons who die friendless in almshouses, hospitals, etc. Similar laws have since been enacted in many of the States of this country. Relatives may effectually object to the anatomical examination of a body, even though the deceased had expressed a desire for it.

Anaxagoras (an-aks-ag'o-ras), an ancient Greek philosopher of the Ionic school, born at Clazomenæ, in Ionia, probably about 500 B.C. When only about twenty years of age he settled at Athens, and soon gained a high reputation, and gathered round him a circle of renowned pupils, including Pericles, Euripides, Socrates, etc. At the age of fifty he was publicly charged with impiety and condemned to death, but the sentence was commuted to perpetual banishment. He thereupon went to Lampsacus, where he died about 428. Anaxagoras belonged to the atomic school of Ionic philosophers. He held that there was an infinite number of different kinds of elementary atoms, and that these, in themselves motionless and originally existing in a state of chaos, were put in motion by an eternal, immaterial, spiritual, elementary being, *Nous* (Intelligence), from which motion the world was produced. The stars were, according to him, of earthy materials; the sun a glowing mass, about as large as the Peloponnesus; the earth was flat; the moon a dark, inhabitable body, receiving its light from the sun; the comets wandering stars.

Anaximander (an-aks-i-man'der), an ancient Greek (Ionic) philosopher, was born at Miletus in 611 B.C., and died 547. The fundamental principle of his philosophy is that the source of all things is an undefined substance infinite in quantity. The firmament is composed of heat and cold, the stars of air and fire. The sun occupies the highest place in the heavens, has a circumference twenty-eight times larger than the earth, and resembles a cylinder, from which streams of fire issue. The moon is likewise a cylinder, nineteen times larger than the earth. The earth has the shape of a cylinder, and is placed in the midst of the universe, where it remains suspended. Anaximander occupied himself a great deal with mathematics and geography. To him is credited the invention of geographical maps and the first application of the *gnomon* or style fixed on a horizontal plane to determine the solstices and equinoxes.

Anaximines (an-aks-im'e-nēz), OF MILETUS, an ancient Greek (Ionic) philosopher, according to

whom air was the first principle of all things. Finite things were formed from the infinite air by compression and rarefaction produced by eternally existent motion; and heat and cold resulted from varying degrees of density of the primal element. He flourished about 550 B.C.

Anbury (an'be-ri), called also *Club-root* and *Fingers and Toes*, a disease in turnips, in which knobs or excrescences are formed on the root, which is then useless for feeding purposes. By some authorities it is said that the disease is caused by various species of insects depositing their eggs in the body of the root, while others believe that the insects are attracted by the effluvia of the diseased plant.

Ancachs (ăn-kăch'), a dep, of Peru, between the Andes and the Pacific; area, 16,160 sq. miles; pop. about 500,000.

Ances'tor Worship, this, one of the most ancient of religious systems, continues to be the chief element in the religious ideas of perhaps the larger half of mankind. It extends throughout China, where it is the dominant force of faith; it constitutes the Shintoism of Japan; it exists in Hindustan and in other sections of Asia, and among the native inhabitants of America, Africa and Polynesia. In it the reverence for immediate ancestors leads back through a series of more remote and partly divine ancestors to the earliest ancestor, the creator of man—the Old-old-one, or Akulumkulu, of the Zulus, who conquer in battle with the aid of their ancestral spirits. This system of religion is a subdivision of Animism, the spirits of the dead being assimilated to the spirits supposed to reside in the objects of nature, and tending to replace the latter. Ancestor worship has been the home and hearth religion of many peoples who had a more ornate public worship, such as the ancient Greeks and Romans. The belief in a future life of the spirit assumes the existence of another world and the immortality of mankind, a belief which is lacking in some other forms of worship.

Anchises (an-kī'sēz), the father of the Trojan hero Æneas, who carried him off on his shoulders at the burning of Troy and made him the companion of his voyage to Italy. He died during the voyage at Drepanum, in Sicily.

Anchitherium (ang-ki-thē'ri-um), an animal that lived in North America and Europe in the Upper Eocene period. It was an ancestor of the horse, having three toes, instead of one, as in the horse. It was about the size of a small pony.

Anchor (ang'kėr), an implement for holding a ship or other vessel at rest in the water. In ancient times large stones or crooked pieces of wood

Trotman's Anchor.

heavily weighted with metal were used for this purpose. The anchor now used is of iron, formed with a strong *shank*, at one extremity of which is the *crown*, from which branch out two *arms*, terminating in broad *palms* or *flukes*, the sharp extremity of which is the *peak* or *bill;* at the other end of the shank is the *stock* (fixed at right angles to the plane of the arms), behind which is the *ring*, to which a cable can be attached. The principal use of the stock is to cause the arms to fall so as one of the flukes shall enter the ground. The anchors of the largest size carried by men-of-war are the *best* and *small bowers*, the *sheet*, and the *spare*, to which are added the *stream* and the *kedge*, which are used for anchoring in a stream or other sheltered place and for warping the vessel from one place to another. Many improvements and novelties in the shape and construction of anchors have been introduced within recent times. The principal names connected with these alterations are those of Lieut. Rodgers, who introduced the *hollow-shanked anchor* with the view of increasing the strength without adding to the weight; Mr. Porter, who made the arms and flukes movable by pivoting them to the stock instead of fixing them immovably, causing the anchor to take a readier and firmer hold, and avoiding the chance of the cable be-

Martin's Anchor.

coming foul; Mr. Trotman, who has further improved on Porter's invention; and M. Martin, whose anchor is of very peculiar form, and is constructed so as to be self-canting, the arms revolving through an angle of 30° either way, and the shank

points of the flukes being always ready to enter the ground.

Anchor-ice, or ground-ice, a layer of ice which forms on the beds of rivers or shallow brackish seas. It does not form until the temperature is below 10° F. and does not adhere strongly until zero is reached. It does not appear in perfectly still water and is most abundant where the water is most disturbed. When rising it frequently brings up the stones or boulders to which it is attached.

Anchorites (ang'kėr-its), or ANCHORETS (Gr. *anachorētai*, persons who have withdrawn themselves from the world), in the early church a class of religious persons who generally passed their lives in cells, from which they never removed. Their habitations were, in many instances, entirely separated from the abodes of other men, sometimes in the depth of wildernesses in pits or caverns; at other times several of these individuals fixed their habitations in the vicinity of each other. but they always lived personally separate. The continual prevalence of bloody wars, civil commotions, and persecutions at the beginning of the Christian era must have made retirement and religious meditation agreeable to men of quiet and contemplative minds. This spirit. however, as might have been expected. soon led to fanatical excesses; many anchorites went without proper clothing, wore heavy chains, and we find at the close of the fourth century Simeon Stylites passing thirty years on the top of a column without ever descending from it, and finally dying there. In Egypt and Syria, where Christianity became blended with the Grecian philosophy and strongly tinged with the peculiar notions of the East, the anchorets were most numerous; in Europe there were comparatively few, and on the development and establishment of the monastic system they completely disappeared.

Anchovy (an-chō'vi), a small fish of the Herring family, all the species, with exception of the common anchovy (*Engraulis encrasicholus*), whose range is restricted to the temperate zone.

Anchovy (*Engraulis encrasicholus*).

inhabitants of the tropical seas of India and America. The common anchovy, so esteemed for its rich and peculiar flavor, is not much larger than the middle finger. It is caught in vast numbers in the Mediterranean, and frequently on the coasts of France, Holland, and the south of England, and pickled for exportation. A favorite sauce is made by pounding the pickled fish in water, simmering for a short time, adding a little cayenne pepper, and straining the whole through a hair-sieve.

Anchovy-pear (*Grias cauliflōra*), a tree of the natural order Myrtaceæ, a native of Jamaica, growing to the height of 50 feet, with large leaves and large white flowers, and bearing a fruit somewhat bigger than a hen's egg, which is pickled and eaten like the mango, and strongly resembles it in taste.

Anchusa (an-chū'sa). See *Alkanet.*

Anchylosis (ang-ki-lō'ses). See *Ankylosis.*

Ançillon (åṇ-sē-yōṇ), JEAN PIERRE FRÉDÉRIC, an author and statesman of French extraction, born at Berlin in 1767 (where his father was pastor of the French reformed church); died there in 1837. He became professor of history in the military academy at Berlin, and in 1806 he was charged with the education of the crown-prince. He successively occupied several important offices of state, being at last appointed minister of foreign affairs. He wrote on philosophy, history, and politics, partly in French, partly in German.

Anckarström. See *Ankarström.*

Ancona (än-kō'nä), a seaport of Italy, capital of the province of the same name, on the Adriatic, 130 miles N. E. of Rome, with harbor works begun by Trajan, who built the ancient mole or quay. A triumphal arch of white marble, erected in honor of Trajan, stands on the mole. The harbor, once the finest on the coast, has been recently improved; Ancona is now a station of the Italian fleet, and the commerce is increasing. The town is indifferently built, but has some remarkable edifices; among others, the cathedral and the Arch of Trajan. There is also a colossal statue of Count Cavour. Ancona is said to have been founded about four centuries B.C., by Syracusean refugees. It fell into the hands of the Romans in the first half of the third century B.C., and became a Roman colony. Pop. 56,835. The province has an area of 740 square miles, and a population of 302,460.

Ancre, D', (doṇkr), CONCINO CONCINI, MARSHAL AND MARQUIS, was a native of Florence, and on the marriage of Marie de Médici to Henri IV in 1600 came in her suite to France, where he obtained rapid promotion, more especially after the assassination of the king (1610). He became successively Governor of Normandy, Marshal of France, and last of all, prime-minister. Being thoroughly detested by all classes, at last a conspiracy was formed against him, and he was shot dead on the bridge of the Louvre in 1617.

Ancus Marcius (m a r's h e-u s), according to the traditionary history of Rome, the fourth king of that city, who succeeded Tullus Hostilius, 638, and died 614 B.C. He was the son of Numa's daughter, and sought to imitate his grandfather by reviving the neglected observances of religion. He is said to have built the wooden bridge across the Tiber known as the Sublican, constructed the harbor of Ostia, and built the first Roman prison.

Ancyra. See *Angora.*

Andalusia (an-da-lū'she-a; Sp. *Andalucia*), a large and fertile district in the south of Spain, bounded N. by Estramadura and New Castile, E. by Murcia, S. by the Mediterranean Sea, and W. by Portugal and the Atlantic; area, about 33,650 sq. miles, including the modern provinces of Seville, Huelva, Cadiz, Jaen, Cordova, Granada, Almeria, and Malaga. It is traversed throughout its whole extent by ranges of mountains, the loftiest being the Sierra Nevada, many summits of which are covered with perpetual snow (Mulahacen is 11,678 feet). Minerals abound, and several mines have been opened by English companies, especially in the province of Huelva, where the Tharsis and Rio Tinto copper-mines are situated. The principal river is the Guadalquivir. The vine, myrtle, olive, palm, banana, carob, etc., grow abundantly in the valley of the Guadalquivir. Wheat, maize, barley, and many varieties of fruit grow almost spontaneously; besides which, honey, silk, and cochineal form important articles of culture. The horses and mules are the best in the peninsula; the bulls are sought for bull-fighting over all Spain; sheep are reared in vast numbers. Agriculture is in a backward state, and the manufactures are by no means extensive. The Andalusians are descended in part from the Moors, of whom they still preserve decided characteristics. Pop. 3,563,306.

Andaman (an-da-man') ISLANDS, a chain of islands on the east side of the Bay of Bengal, the principal being the North, Middle, South, and Little Andamans. Middle Andaman is about 60 miles long, and 15 or 16 miles broad; North and South Andaman are each about 50 miles long. The inhabitants are about 18,000 in number, and mostly in a very savage state, living almost naked in the rudest habitations. They are small (generally much less than 5 feet, resembling the Negritos of the Philippines), well formed, and active, skillful archers and canoeists, and excellent swimmers and divers. These islands have been used since 1858 as a penal settlement by the Indian government, the settlement being at Port Blair, on South Andaman. Here rice, coffee, pineapples, nutmegs, etc., are grown, while the jungle has been cleared off the neighboring hills. With the Nicobar Islands (q. v.) they form a province, under a chief commissioner. Total area, 3143 sq. miles; pop. 26,459, of whom 10,000 are Hindus.

Andante (ân-dân'tā; It. 'at a walking pace'), in music, denotes a movement somewhat slow, graceful, distinct, and soothing. The word is also applied substantively to that part of a sonata or symphony having a movement of this character.

Andelys, LES (lāz änd-lēz, oṇ-dlē), two towns in France called respectively Grand and Petit Andely, distant half a mile from each other, in the department of Eure, on the right bank of the Seine, 19 miles S. E. of Rouen. The town of Grand Andely dates from the 6th century; its church is one of the finest in the department. Petit Andely owes its origin to Richard Cœur de Lion, who, in 1195, built here the Château Gaillard, in its time one of the strongest fortresses in France, but now wholly a ruin. Pop. 4539.

Andenne (oṇ-den'), a town of Belgium, province of Namur, on the right bank of the Meuse and 10 miles east of Namur; manufactures delftware, porcelain, tobacco-pipes, paper, etc. Pop. 7111.

Andernach (ân'der-nâch), a town of Rhenish Prussia, on the left bank of the Rhine, 10 miles N. W. of Coblentz, partly surrounded with walls. Pop. 7889.

Andersen (an'der-sen), HANS CHRISTIAN, a Danish novelist, poet, and writer of fairy tales, was born of poor parents at Odense, 2d April, 1805. He learned to read and write in a charity school, from which he was taken when

only nine years old, and was put to work in a manufactory in order that his earnings might assist his widowed mother. In his leisure time he eagerly read national ballads, poetry, and plays, and wrote several tragedies full enough of sound and fury. In 1819 he went to Copenhagen, but failed in getting any of his plays accepted, and in securing an appointment at the theater, having to content himself for some time with unsteady employment as a joiner. His abilities at last brought him under the notice of Councilor Collin, a man of considerable influence, who procured for him free entrance into a government school at Slagelse. From this school he was transferred to the university, and soon became favorably known by his poetic works. Through the influence of Oehlenschläger and others he received a royal grant to enable him to travel, and in 1833 he visited Italy, his impressions of which he published in *The Improvisatore* (1835), a work which rendered his fame European. The scene of his following novel, *O. T.*, was laid in Denmark, and in *Only a Fiddler* he described his own early struggles. In 1835 appeared the first volume of his *Fairy Tales*, of which successive volumes continued to be published year by year at Christmas, and which have been the most popular and widespread of his works. Among his other works are *Picture-books without Pictures*, *A Poet's Bazaar*—the result of a voyage in 1840 to the East—and a number of dramas. In 1845 he received an annuity from the government. He visited England in 1848, and acquired such a command of the language that his next work, *The Two Baronesses*, was written in English. In 1853 he published an autobiography, under the title *My Life's Romance*, an English translation of which, published in 1871, contained additional chapters by the author, bringing the narrative to 1867. Among his later works we may mention, *To Be or Not To Be* (1857); *Tales from Jutland* (1859); *The Ice Maiden* (1863). He died 4th August, 1875, having had the pleasure of seeing many of his works translated into most of the European languages.

Anderson (an'dėr-son), JAMES, a Scottish writer on political and rural economy, born in 1739; died in 1808. In 1790 he started the *Bee*, which ran to eighteen vols., and contains many useful papers on agricultural, economical and other topics. Among his other publications, *Recreations in Agriculture, Natural History*, etc., contains anticipations of theories afterwards propounded by Malthus and Ricardo.

Anderson, JOHN, professor of natural philosophy in the University of Glasgow; born 1726, died 1796. By his will he directed that the whole of his effects should be devoted to the establishment of an educational institution in Glasgow, to be denominated *Anderson's University*, for the use of the unacademical classes. According to the design of the founder, there were to be four colleges—for arts, medicine, law, and theology—besides an initiatory school. As the funds, however, were totally inadequate to the plan, it was at first commenced with only a single course of lectures on natural philosophy and chemistry. The institution grew and was later incorporated with other institutions to form the Glasgow and West of Scotland Technical College, the medical school, however, retaining a distinct position.

Anderson, Rasmus Björn, author, born at Albion, Wisconsin, in 1846, of Norwegian parentage, was professor of Scandinavian languages in the University of Wisconsin, 1875–84. Author of *America not Discovered by Columbus; Norse Mythology; Viking Tales of the North.* U. S. Minister to Denmark (1884-89.)

Anderson, Robert, soldier, born near Louisville, Kentucky, in 1805; graduated at West Point in 1825; was a captain in the Mexican War; major of artillery in 1857; in 1860 took command of the forts in Charleston harbor. He defended Fort Sumter against the Confederate attack, in 1861, the opening event of the civil war, when it became untenable, withdrawing on April 13. He was promoted brigadier-general, but from ill health or other cause took no further part in the war. On April 13, 1865, he raised over Fort Sumter the flag he had lowered four years before. Died in 1871.

Anderson, a city, county seat of Madison county, Indiana, 35 miles N. E. of Indianapolis. It is a manufacturing city and trade center, having over 100 factories producing nearly 60 different products, including magnetos and starters for automobiles, locomotive headlights, gas regulators, oil and gas engines, etc. Pop. (1920) 29,767.

Anderson, a city, county seat of Anderson county, South Carolina, 126 miles W. N. W. of Columbia, in a splendid cotton and live-stock section. It has cotton and cottonseed-oil mills, and many other manufactures. Hydro-electric power. Pop. (1920) 10,570.

Andersonville, village in Sumter Co., Ga. Notorious as a military prison during the Civil War. Through overcrowding, lack of food, and general unsanitary conditions 13,000 Federal prisoners died in the enclosure between February, 1864, and April, 1865.

Andes (an'dēz), or, as they are called in Spanish South America, CORDILLERAS (ridges) DE LOS ANDES, or simply CORDILLERAS, a range of mountains stretching along the whole of the west coast of South America, from Cape Horn to the Isthmus of Panama and the Caribbean Sea. In absolute length (4500 miles) no single chain of mountains approaches the Andes, and only a certain number of the higher peaks of the Himalayan chain rise higher above the sea level; which peak is the highest of all is not yet settled. Several main sections of this huge chain are distinguishable. The Southern Andes present a lofty main chain, with a minor chain running parallel to it on the east, reaching from Tierra del Fuego and the Straits of Magellan northward to about lat. 28° s., and rising in Aconcagua to a height of 22,860 feet. North of this is the double chain of the Central Andes, inclosing the wide and lofty plateaus of Bolivia and Peru, which lie at an elevation of more than 12,000 feet above the sea. The mountain system is here at its broadest, being about 500 miles across. Here are also several very lofty peaks, as Illampu or Sorata (21,484 feet), Sahama (21,054), Illimani (21,024). Further north the outer and inner ranges draw closer together, and in Ecuador there is but a single system of elevated masses, generally described as forming two parallel chains. In this section are crowded together a number of lofty peaks, most of them volcanoes, either extinct or active. Of the latter class are Pichincha (15,918 feet), with a crater 2500 feet deep; Tunguragua (16,685 feet); Sangay (17,460 feet); and Cotopaxi (19,550 feet). The loftiest summit here appears to be Chimborazo (20,581 feet); others are Antisana (19,260 feet) and Cayambe (19,200 feet). Northward of this section the Andes break into three distinct ranges, the eastmost running northeastward into Venezuela, the westmost running northwestward to the Isthmus of Panama. In the central range is the volcano of Tolima (18,400 feet). The western slope of the Andes is generally exceedingly steep, the eastern much less so, the mountains sinking gradually to the plains. The whole range gives evidence of volcanic action, but it consists almost entirely of sedimentary rocks. Thus mountains may be found rising to the height of over 20,000 feet, and fossiliferous to their summits (as Illimani and Sorata or Illampu). There are about thirty volcanoes in a state of activity. These burning mountains are distributed throughout the system, their peaks varying in height from 13,000 to 20,000 feet. All the districts of the Andes system have suffered severely from earthquakes, towns having been either destroyed or greatly injured by these visitations. Peaks crowned with perpetual snow are seen all along the range, and glaciers are also met with, more especially from Aconcagua southwards. The passes are generally at a great height, the most important being from 10,000 to 15,000 feet. Railways have been constructed to cross the chain at a similar elevation. The Andes are extremely rich in the precious metals, gold, silver, copper, platinum, mercury, and tin all being present; lead and iron are also found. The llama and its congeners—the guanaco, vicuna, and alpaca—are characteristic of the Andes. Among birds, the condor is the most remarkable. The vegetation necessarily varies much according to elevation, latitude, rainfall, etc., but generally is rich and varied. Except in the south and north little rain falls on the western side of the range, and in the center there is a considerable desert area. On the east side the rainfall is heavy in the equatorial regions, but in the south is very scanty or altogether deficient. From the Andes rise two of the largest water systems of the world—the Amazon and its affluents, and the La Plata and its affluents. Besides which, in the north, from its slopes flow the Magdalena to the Caribbean Sea, and some tributaries to the Orinoco. The mountain chain pressing so close upon the Pacific Ocean, no streams of importance flow from its western slopes. The most important lake is Titicaca on the Bolivian plateau. In the Andes are towns at a greater elevation than anywhere else in the world, the highest being the silver mining town of Cerro de Pasco (14,270 feet), the next being Potosi. The Transandine Tunnel, on the railway from Valparaiso to Buenos Ayres, was first pierced November 27, 1909, and on April 5, 1910, was formally opened to traffic. Its length is nearly 2 miles, 4538 feet on the Chilean side, 5847 on the Argentine; elevation above sea level is 10,460 feet. It is 18 feet high and 16 feet in width; the railway is narrow gauge and single track. Cost about $2,500,000.

Andira (an-dī'ra), a genus of leguminous American trees, found mainly in tropical localities.

Andiron (and'ī-ėrn), a horizontal iron bar raised on short legs, with

an upright standard at one end, used to support pieces of wood when burning in an open hearth, one andiron being placed on each side of the hearth.

Andkhoo, or ANDKHOUI (ånd-*hö'*, ånd-*hö'*i), a town of Afghanistan, about 200 miles S. of Bokhara, on the commercial route to Herat. Pop. estimated at 15,000.

Andocides (an-dos'i-dēz), an Athenian orator, born in 467 B.C., died about 393 B.C. He took an active part in public affairs, and was four times exiled; the first time along with Alcibiades, for profaning the Eleusinian mysteries. Several of his orations are extant.

Andorre, or ANDORRA (an-dor', an-dor'ra), a small nominally independent state in the Pyrenees, south of the French department of Ariège, with an area of about 175 square miles. It has been a separate state for six hundred years; is governed by its own civil and criminal codes, and has its own courts of justice, the laws being administered by two judges, one of whom is chosen by France, the other by the Bishop of Urgel, in Spain. The little state pays annually 920 francs (about $184) to France, and 460 francs to the Bishop of Urgel. The chief industry is the rearing of sheep and cattle. The commerce is largely in importing contraband goods into Spain. The inhabitants, who speak the Catalan dialect of Spanish, are simple in their manners, their wealth consisting mainly of cattle and sheep. The village of Old Andorre is the capital. Pop. about 6,000.

Andover (an'do-ver), a town in England, in Hants, 12 miles N. by W. of Winchester, with a fine church, and a trade in corn, malt, etc. Interesting Roman remains found in the vicinity. Pop. 7596.

An'dover, a town in Massachusetts, 25 miles N. N. W. of Boston, chiefly notable for its literary institutions—Phillip's Academy, founded in 1778; the Andover Theological Seminary, founded in 1807, and a female academy founded in 1829. Pop. (1920) 8268.

Andrassy (an-drä'shē), COUNT JULIUS, a Hungarian statesman, born in 1823; took part in the revolution of 1848, was condemned to death, but escaped and went into exile; appointed premier when self-government was restored to Hungary in 1867; became imperial minister for foreign affairs in 1871, retiring from public life in 1879. Died in 1890.

Andre' (an'drā), MAJOR JOHN, adjutant-general in the British army during the American Revolutionary War. Employed to negotiate the defection of the American general Arnold, and the delivery of the works at West Point, he was apprehended in disguise, September 23, 1780, within the American lines, declared a spy from the enemy, and hanged Oct. 2, 1780. His remains were brought to England in 1821 and interred in Westminster Abbey, where a monument has been erected to his memory.

Andreæ (ån'dre-ē), JOHANN VALENTIN (1586-1654), a German theologian, author of numerous tracts, several of them of an amusing and satirical character; erroneously regarded as the founder, or restorer of the Rosicrucian order.

Andreyev (ån'drā-yef), LEONID NIKOLAEVITCH (1871-1919), a Russian novelist and dramatist. Some of his plays have been produced in America, notably *He Who Gets Slapped.* Other plays include *Anathema, Savva, The Black Masks, Thought, Youth, Love Your Neighbor,* etc. He died in Finland, Sept. 12, 1919.

An'dree, SALOMON AUGUST, Swedish aëronaut, born about 1855. He was examiner-in-chief at the patent office, practiced aëronautics, and in 1896 projected a balloon voyage to the North Pole. He started in 1897, with two companions, from Danes Island, east of Spitzbergen, and was never heard of afterwards.

Andrew (an'drū), ST., brother of St. Peter, and the first disciple whom Christ chose. He is said to have preached in Scythia, in Thrace and Asia Minor, and in Achaia (Greece), and according to tradition he was crucified at Patræ, now Patras, in Achaia, on a cross of the form ×. Hence such a cross is now known as a St. Andrew's cross. The Russians revere him as the apostle who brought the gospel to them; the Scots, as the patron saint of their country. The day dedicated to him is the 30th of November. The Russian order of St. Andrew, the highest of the empire, was instituted by Peter the Great in 1698. For the Scottish Knights of St. Andrew or the Thistle, see *Thistle.*

An'drews, ELI'SHA BENJAMIN, educator, born at Hilldale, New Hampshire, in 1844. He served in the Civil war, losing an eye in battle. Graduating at Brown University in 1870 and in theology in 1874, he became professor of history and political economy at Brown in 1882, professor at Cornell in 1888, and president of Brown in 1889. He became superintendent of schools in Chicago in 1898; chancellor of the University of Nebraska, 1900-1908. Among his several works are *History of the Last Quarter Century in the United States,*

Andrewes (an′drūs), LANCELOT, an eminent and learned bishop of the English Church; born in London in 1555; died at Winchester 1626; was high in favor both with Queen Elizabeth and James I. In 1605 he became Bishop of Chichester, in 1609 was translated to Ely, and appointed one of the king's privy-councilors; and in 1618 he was translated to Winchester. He was one of those engaged in preparing the authorized version of the Scriptures. He left sermons, lectures, and other writings.

An′drews, ST., an ancient city and seat of a university in Fifeshire, Scotland, 31 miles N. E. from Edinburgh; was erected into a royal burgh by David I in 1140, and after having been an episcopal, became an archiepiscopal see in 1472, and was for long the ecclesiastical capital of Scotland. The cathedral, now in ruins, was begun about 1160, and took 157 years to finish. The old castle, founded about 1200, and rebuilt in the fourteenth century, is also an almost shapeless ruin. In it James III was born and Cardinal Beaton assassinated, and in front of it George Wishart was burned. There are several other interesting ruins. The trade and manufactures are of no importance, but the town is in favor as a watering-place. Golfing is much played here.—The UNIVERSITY OF ST. ANDREWS, the oldest of the Scotch universities, founded in 1411, consists of three colleges, St. Salvator, St. Leonard's, and St. Mary's. Originally all three had teachers both in arts and theology; but in 1579 the colleges of St. Salvator and St. Leonard were confined to the teaching of arts and medicine, and that of St. Mary to theology. In 1747 the two former colleges were united by act of Parliament. The average number of students is about 200. In connection with the university is a library containing about 100,000 printed volumes and numerous MSS. The university unites with that of Edinburgh in sending a member to Parliament. Madras College or Academy, founded by Dr. Bell, of Madras, the principal secondary school of the place, provides accommodation for upwards of 1,500 scholars. Pop. 7,621.

Andria (än′drā-ä), a town of South Italy, province of Bari, with a fine cathedral, founded in 1046; the church of Sant' Agostino, with a beautiful pointed Gothic portal; a college; manufactures of majolica, and a good trade. Pop. 49,569.

Andrœcium (an-drē′si-um), in botany, the male system of a flower; the aggregate of the stamens.

Andromache (an-drom′a-kē), in Greek mythology, wife of Hector, one of the most attractive female characters of Homer's *Iliad.* The passage describing her parting with Hector when he was setting out to his last battle is well known and much admired. Euripides and Racine have made her the chief character of tragedies.

Andromeda (an-drom′e-da), in Greek mythology, daughter of the Ethiopian king Cepheus and of Cassiopeia. Cassiopeia having boasted that her daughter sur assed the Nereids, if not Hēra (Juno) herself, in beauty, the offended maidens prevailed on their father, Poseidon (Neptune), to afflict the country with a horrid sea monster, which threatened universal destruction. To appease the offended god, Andromeda was chained to a rock, but was rescued by Perseus; and after death was changed into a constellation.

Andromeda, a genus of plants belonging to the heaths. One species, *A. polifolia,* wild rosemary, a beautiful evergreen shrub, grows by the side of ponds and in swamps in the Northern States.

Andronicus (an-dro-nī′kus), the name of four emperors of Constantinople.—ANDRONICUS I, Comnenus; born 1110; killed by the people for his cruelty in 1185.—ANDRONICUS II, Palæologus, born 1258; died 1332. His reign is celebrated for the invasion of the Turks.—ANDRONICUS III, Palæologus the Younger, born 1296; died 1341. —ANDRONICUS IV, Palæologus, eldest son of John V; dethroned his father in 1377, who recovered his throne with the aid of the Turks. Died 1385.

Androni′cus, of Rhodes, a peripatetic philosopher who lived at Rome in the time of Cicero. He arranged Aristotle's works in much the same form as they retain in present editions.

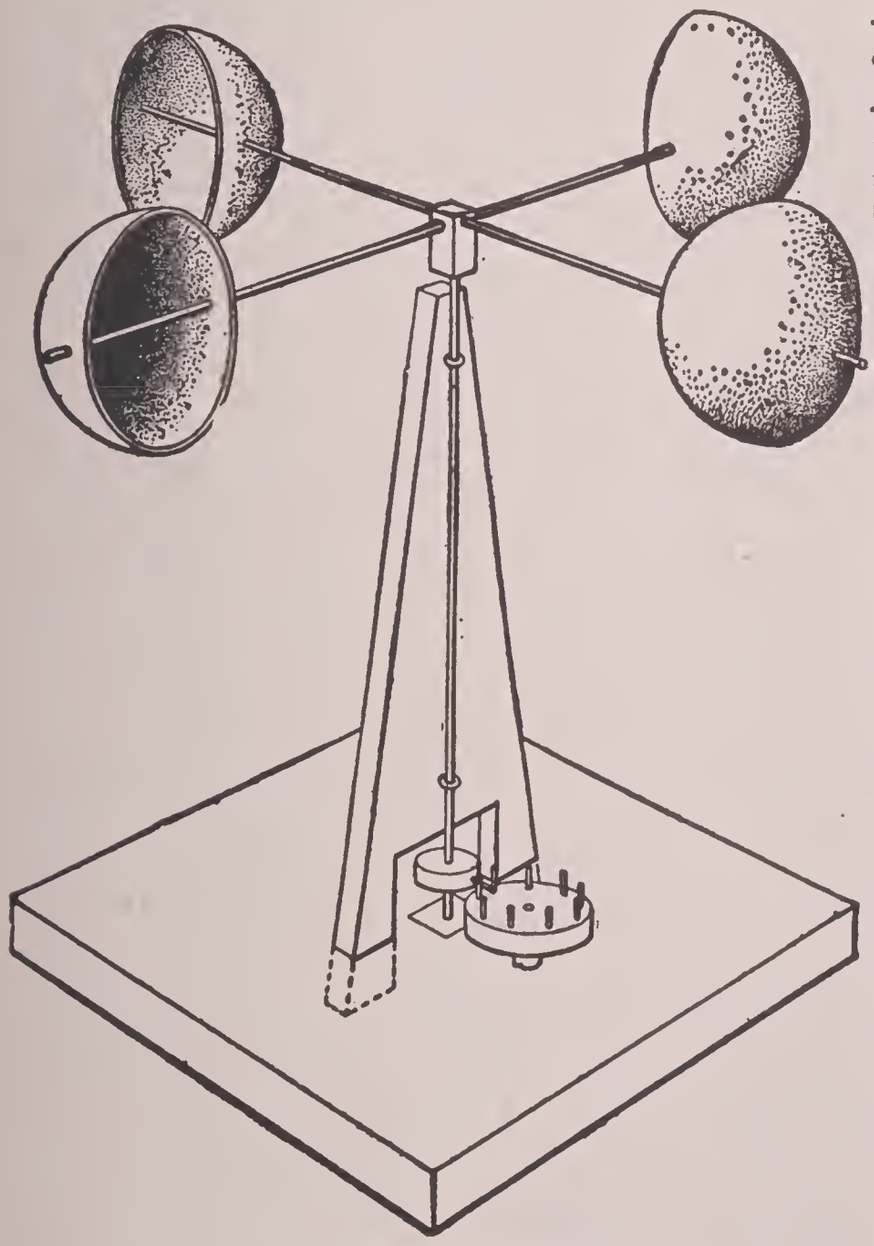
Androni′cus, LIVIUS, the most ancient of the Latin dramatic poets; flourished about 240 B.C.; by origin a Greek, and long a slave. A few fragments of his works have come down to us.

Androni′cus Cyrrhestes (sir-e s′-tēz), a Greek architect about 100 B.C., who constructed at Athens the Tower of the Winds, an octagonal building, still standing. On the top was a Triton, which indicated the direction of the wind. Each of the sides had a sort of dial, and the building formerly contained a clepsydra or water-clock.

Andropogon (an-dro-pō′gon), a large genus of grasses, mainly natives of warm countries. *A. scha-*

nanthus is the sweet-scented lemon-grass of conservatories. Others also are fragrant.

Andros (ăn'dros), Sir Edmund (1637-1714), an English colonial governor in America, born in London. He was governor of New York 1674-81, and in 1386 became governor of the New England colonies united into one province, the Dominion of New England. In 1688 New York and New Jersey were attached to New England and his rule extended over the territory between the Delaware and the St. Croix. On complaint of the colonists of New England he was sent to England, but was never formally tried. He returned to America and was governor of Virginia 1692-98.



Home-made Anemometer.

Andujar (ăn-*dö-här'*), a town in Spain, in Andalusia, 50 miles E. N. E. of Cordova, on the Guadalquivir, which is here crossed by a fine bridge; manufactures a peculiar kind of porous earthern water bottles and jugs (*alcarrazas*). Pop. 16,302.

Anecdote (an'ek-dōt), originally some particular relative to a subject not noticed in previous works on that subject; now any particular or detached incident or fact of an interesting nature; a single passage of private life.

Anegada (ăn-ā-gä'dă), a British West India island, the most northern of the Virgin group, 10 miles long by 4½ broad; contains numerous salt ponds, from which quantities of salt are obtained.

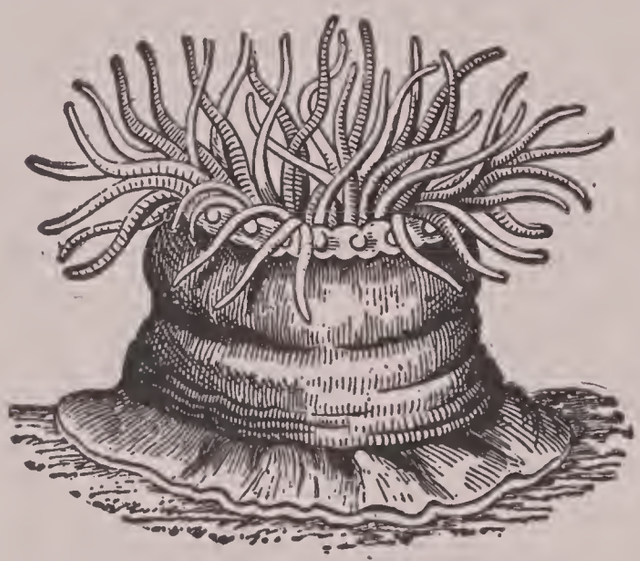
Anelectric, a body not easily electrified.

Anelectrode, the positive pole of a galvanic battery.

Anemometer (an-e-mom'e-tėr; Gr. *anemos*, wind, *metron*, measure), an instrument for measuring the force and velocity of the wind. This force is usually measured by the pressure of the wind upon a square plate attached to one end of a spiral spring (with its axis horizontal), which yields more or less according to the force of the wind, and transmits its motion to a pencil which leaves a trace upon paper moved by clockwork. For indicating the velocity of the wind, the instrument which has yielded the best results consist of four hemispherical cups attached to the ends of equal horizontal arms, forming a horizontal cross which turns freely about a vertical axis which is strengthened and supported. By means of an endless screw (worm) carried by the axis a train of wheel-work is set in motion; and the indication is given by a hand which moves round a dial; or in some instruments by several hands moving round different dials like those of a gas-meter. This was invented by Robinson in 1846, and is the kind chiefly used in finding velocities. There are various other forms of instruments, one of which is portable.

adaptable to varying conditions of space, and is especially intended for measuring the velocity of currents of air passing through mines, and the ventilating spaces of hospitals and other public buildings. The direction of the wind as indicated by a vane can also be made to leave a continuous record by various contrivances; one of the most common being a pinion carried by the shaft of a vane, and driving rack which carries a pencil.

Anemone (an-em'o-nē; Gr. *anemos*, wind), wind-flower, a genus of plants belonging to the Buttercup family (Ranunculaceæ), containing many species. The wood anemone, *A. nemorōsa*, is a common and interesting



Sea Anemone (*Actinia mesembryanthemum*).

little plant, and its white flowers are an ornament of many a woodland scene and mountain pasture in April and May. *A. coronaria* is a hardy plant, with large variegated flowers. *A. Hortensis*, star anemone, is one of the finest species.

Anem'one, Sea. See *Sea-anemone.*

Anemophilous (an-e-mof'i-lus), said of flowers that are fertilized by the wind conveying the pollen.

Anemoscope (a-nem'o-skōp), any contrivance indicating the direction of the wind; generally applied to a vane which turns a spindle descending through the roof to a chamber, where, by means of a compass-card and index, the direction of the wind is shown.

Anemosis (a-ne-mō'sis), the condition in timber also known as wind-shaken, indicated internally by a breaking of connection between the annual layers. It occurs in many species of trees and has been ascribed to the effect of violent winds, but is more probably due to frost or lightning.

Aneroid (an'e-roid) Barometer. See *Barometer.*

Anethum (a-nē'thum), a genus of plants; dill.

Aneurin (an'ū-rin), a poet and prince of the Cambrian Britons who flourished about 600 A.D., author of an epic poem, the *Gododin*, relating the defeat of the Britons of Strathclyde by the Saxons at the battle of Cattraeth.

Aneurism, Aneurysm (an'ū-rizm. Gr. *aneurysma*, a widening), the dilatation or expansion of some part of an artery. Aneurisms arise partly rrom the too violent motion of the blood, and partly from degenerative changes occurring in the coats of the artery, diminishing their elasticity. They are therefore more frequent in the great branches and particularly in the vicinity of the heart, in the arch of the aorta, and in the extremities, where the arteries are exposed to frequent injuries by stretching, violent bodily exertions, thrusts, falls, and contusions. An internal aneurism may burst and cause death.

Angara (äng-gä-rå'), a Siberian river which flows into Lake Baikal at its N. extremity, and leaves it near the S. W. end, latterly joining the Yenisei as the Lower Angara or Upper Tunguska.

Angel (ān'jel; Greek *angelos*, a messenger), one of those spiritual intelligences who are regarded as dwelling in heaven and employed as the ministers or agents of God. To these the name of good angels is sometimes given, to distinguish them from bad angels, who were originally created to occupy the same blissful abode, but lost it by rebellion. Scripture frequently speaks of angels, but with great reserve, Michael and Gabriel alone being mentioned by name in the canonical books, while Raphael is mentioned in the Apocrypha. The angels are represented in Scripture as in the most elevated state of intelligence, purity, and bliss, ever doing the will of God so perfectly that we can seek for nothing higher or better than to aim at being like them. There are indications of a diversity of rank and power among them, and something like angelic orders. They are represented as frequently taking part in communications made from heaven to earth, as directly and actively ministering to the good of believers, and shielding or delivering them from evils incident to their earthly lot. That every person has a good and a bad angel attendant on him was an early belief, and is held to some extent yet. Roman Catholics show a certain veneration or

honor to angels, and beg their prayers and their kind offices; St. Paul, in Col. ii: 18, forbids the worship of angels.

Angel, a gold coin introduced into England in the reign of Edward IV and coined down to the Commonwealth, so named from having the representation of the archangel Michael piercing a dragon upon it. It had different value in different reigns, varying from 6*s.* 8*d.* to 10*s.*

Angel of Queen Elizabeth.

Angel-fish, a fish, *Squatina angelus*, nearly allied to the sharks, very ugly and voracious, preying on other fish. It is from 6 to 8 feet long, and takes its name from its pectoral fins, which are very large, extending horizontally like wings when spread. This fish connects the rays with the sharks, but it differs from both in having its mouth placed at the extremity of the head. It is common on the south coasts of Britain, and is also called *Monk-fish* and *Fiddle-fish*.

Angelica (an-jel'i-ka), a genus of tall umbelliferous plants found in the northern temperate regions and in New Zealand. *A. sylvestris* is the wild angelica of England, and *A. officinalis* is the garden angelica of Europe. The latter is a native of the banks of rivers and wet ditches in the northern parts of Europe, where it is also grown for its strong and agreeable aromatic odor. The garden angelica was at one time much cultivated for the blanched stalks, which were used as celery is now. The tender stalks and midribs of the leaves, candied, are still a well-known article of confectionery. Linnæus describes the use of the dried root in Lapland as tobacco, and of the stem as a vegetable. *A. atropurpurea* is the great angelica of the United States.—The name has been given to a sweet wine made in California.

Angelico (ån-jel'i-kō), Fra, the common appellation of *Fra Giovanni da Fiesole*, one of the most celebrated of the early Italian painters. Born 1387, he entered the Dominican order in 1407, and was employed in painting the monastery of S. Marco in Florence, and S. Domenico in Fiesole, with a series of frescoes. These pictures gained him so much celebrity that Nicholas V invited him to Rome, to ornament his private chapel in the Vatican, and offered him the archbishopric of Florence, which was declined. He died at Rome 1455. His works were considered unrivaled in finish and in sweetness and harmony of color, and were made the models for religious painters of his own and succeeding generations. His easel pictures are not rare in European galleries.

Angell (ān'jel), James Burrill, scholar and diplomat, born at Scituate, Rhode Island, in 1829; graduated at Brown University in 1849, and was professor of modern languages there, 1853-60. Edited the Providence *Journal*, 1860-66, was president of the University of Vermont 1866-71, and afterwards president of the University of Michigan. In 1880-81 he was Minister to China, and to Turkey 1897-98. Died April 11, 1916.

Angeln (ång'eln), a district in Schleswig of about 300 sq. m., bounded N. by the Bay of Flensburg, S. by the Schlei, E. by the Baltic, the only continental territory which has retained the name of the Angles.

Angelo (ån'je-lō), Michael. See *Buonarotti*.

Angelus (an'je-lus), in the Roman Catholic Church a short form of prayer in honor of the incarnation, consisting mainly of versicles and responses, the angelic salutation three times repeated, and a collect, so named from the word with which it commences, '*Angelus* Domini' (Angel of the Lord). Hence, also, the bell tolled in the morning, at noon, and in the evening to indicate the time when the angelus is to be recited.

Angermann (ong'er-mån), a Swedish river which falls into the Gulf of Bothnia after a course of 200 miles, and is noted for its fine scenery.

Angermünde (ång'er-m ü n-d e), a town in Prussia, on Lake Münde, 42 miles northeast of Berlin. Pop. 7,466.

Angers (åṇ-zhā), a town and river-port of France, capital of the department of Maine-et-Loire, and formerly of the province of Anjou, on the banks of the Maine, 5½ miles from the Loire, 150 miles S. W. of Paris. Has an old castle, once a place of great strength, now used as a prison, barrack, and powder-magazine; a fine cathedral of the twelfth and thirteenth centuries, with very fine old painted windows, and the remains of a hospital founded by Henry II of England in 1155; manufactures sail-cloth, hosiery, leather and

chemicals. In the neighborhood are immense slate-quarries. Pop. 73,585.

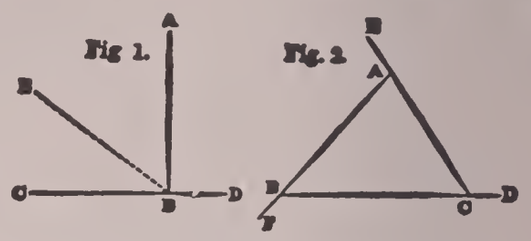
Angevins (an'je-vins), natives of Anjou, often applied to the race of English sovereigns called Plantagenets (which see). Anjou became connected with England by the marriage of Matilda, daughter of Henry I, with Geoffrey V, Count of Anjou. The Angevin kings of England were Henry II, Richard I, John, Henry III, Edward I, Edward II, Edward III, and Richard II.

Angilbert (ang'gil-bert), St., the most celebrated poet of his age, secretary and friend of Charlemagne, whose daughter, Bertha, he married. In the latter part of his life he retired to a monastery, of which he became abbot. Was the author of some extant Latin poems. Died 814.

Angina Pectoris (an-jī'na pek'toris), or Heart-spasm, a disease characterized by an extremely acute constriction, felt generally in the lower part of the sternum, and extending along the whole side of the chest and into the corresponding arm, a sense of suffocation, faintness, and apprehension of approaching death: seldom experienced by any but those with organic heart disease. The disease rarely occurs before middle age and is more frequent in men than in women. Those liable to attack must lead a quiet, temperate life, avoiding all scenes which would unduly rouse their emotions. The first attack is occasionally fatal, but usually death occurs as the result of repeated seizures. The paroxysm may be relieved by opiates, or the inhalation, under due precaution, of anæsthetic vapors.

Angiosperm (an'ji-ō-spėrm), a term for any plant which has its seeds enclosed in a seed-vessel. Exogens are divided into those whose seeds are enclosed in a seed-vessel and those with seeds produced and ripened without the production of a seed-vessel. The former are *angiosperms*, and constitute the principal part of the species; the latter are *gymnosperms*, and chiefly consist of the Coniferæ and Cycadaceæ.

Angle (ang'gl), the point where two lines meet, or the meeting of two lines in a point. A *plane rectilineal angle* is formed by two straight lines which meet one another, but are not in the same straight line; it may be considered the degree of opening or divergence of the two straight lines which thus meet one another. A *right angle* is an angle formed by a straight line falling on another perpendicularly, or an angle which is measured by an arc of 90 degrees. When a straight line, as A B (fig. 1), standing on another straight line C D, makes the two angles A B C and A B D equal to one another, each of these angles



is called a *right angle*. An *acute angle* is that which is less than a right angle, as E B C. An *obtuse angle* is that which is greater than a right angle, as E B D. Acute and obtuse angles are both called *oblique*, in opposition to right angles. *Exterior* or *external angles*, the angles of any rectilineal figure without it, made by producing the sides; thus, if the sides A B, B C, C A of the triangle A B C (fig. 2) be produced to the points F D E, the angles C B F, A C D, B A E are called *exterior* or *external angles*. A *solid angle* is that which is made by more than two plane angles meeting in one point and not lying in the same plane, as the angle of a cube. A *spherical angle* is an angle on the surface of a sphere, contained between the arcs of two great circles which intersect each other.

Angle-indicator, a sort of up-and-down compass used by aviators. It consists of a circular cup, with degrees marked by lines running around it. The pendulum is an arm mounted on a large ball.

Angler-fish (ang'gler; *Lophius piscatorius*), also from its habits and appearance called *Fishing-frog* and *Sea-devil*, a remarkable fish often found on the British coasts. It is from 3 to 5 feet long; the head is very wide, depressed, with protuberances, and long movable tendrils: the mouth is capacious.

Angles (an'gles) a Low German tribe that in the earliest historical period had its seat in the district about Angeln, in the duchy of Schleswig, and in the fifth century and subsequently crossed over to Britain along with bands of Saxons and Jutes (and probably Frisians also), and colonized a great part of what from this tribe has received the name of England, as well as a portion of the Lowlands of Scotland. The Angles formed the largest body among the Germanic settlers in Britain, and founded the three kingdoms of East Anglia, Mercia, and Northumbria.

Anglesey (ang'gl-sē), or Anglesea ('the Angles' Island'), an island and county of North Wales, in the

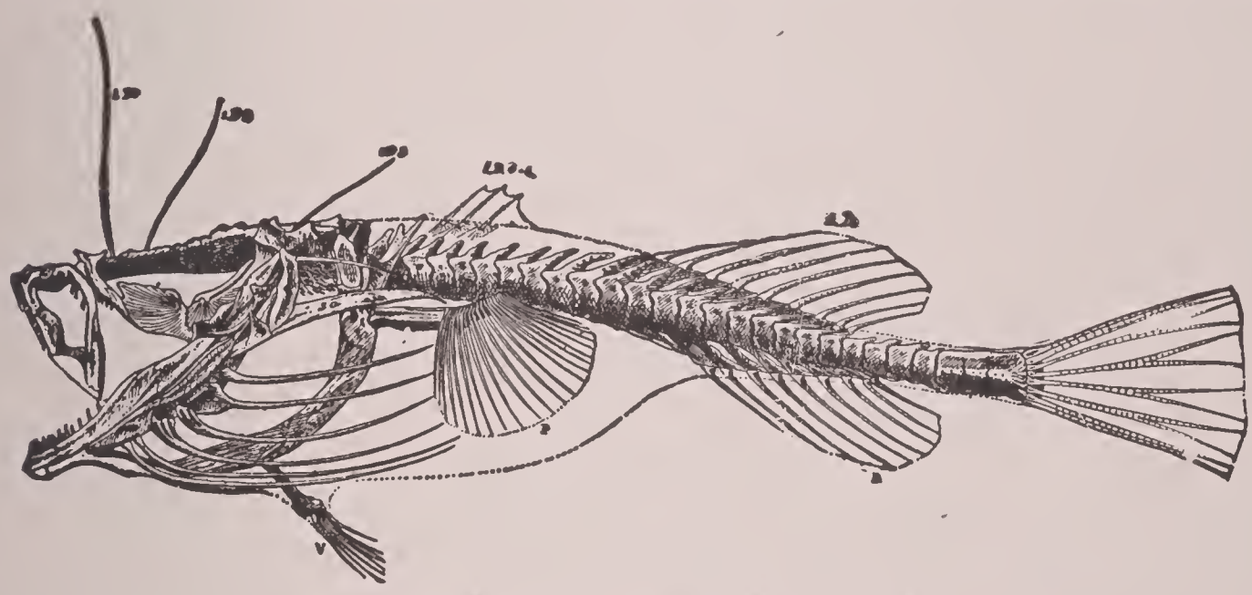
Irish Sea, separated from the mainland by the Menai Strait; 20 miles long and 17 miles broad; area, 176,630 acres. The surface is comparatively flat, the climate is milder than that of the adjoining coast, and the soil fertile and tolerably well cultivated. Anglesey yields a little copper, lead, silver, ocher, etc. The Menai Strait is crossed by a magnificent suspension-bridge, 580 feet between the piers and 100 feet above highwater mark, and also by the great Britannia Tubular Railway Bridge. The chief market-towns are Beaumaris, Holyhead, Llangefni, and Amlwch. Pop. 50,943.

Anglesey, HENRY WILLIAM PAGET, MARQUIS OF, English soldier and statesman, the eldest son of Henry, first Earl of Uxbridge, was born in 1768. Educated at Oxford, he entered the army in 1793, and in 1794 he took part in the campaign in Flanders under the Duke of York. In 1808 he was sent into Spain with two brigades of cavalry to join Sir John Moore, and in the retreat to Coruña commanded the rear guard. In 1812 he became, by his father's death, Earl of Uxbridge. On Napoleon's escape from Elba he was appointed commander of the British cavalry, and at the battle of Waterloo, by the charge of the heavy brigade overthrew the Imperial Guard. For his services he was created Marquis of Anglesey. In 1828 he became lord-lieutenant of Ireland and made himself extremely popular, but was recalled in consequence of favoring Catholic emancipation. He was again lord-lieutenant in 1830; but lost his popularity by his opposition to O'Connell and his instrumentality in the passing of the Irish coercion acts; and he quitted office in 1833. In 1846-52 he was master-general of the ordnance. He died in 1854.

Anglican (ang'gli-kan) CHURCH. See *England*—Church.

Anglican Communion, a term used to denote the various churches throughout the world in communion with the Church of England. As an integral body it is represented by its bishops at the Lambeth Conferences, held from time to time. The Anglican Communion includes the Church of England, the Church of Ireland, the Church in Scotland, the Protestant Episcopal Church of the United States, the Canadian Church, and the Episcopal churches in India and Ceylon, Japan, Australasia, South Africa, etc.

Angling (ang'gling), the art of catching fish with a hook or *angle* (A. Sax. *angel*) baited with worms, small



Skeleton of Angler-fish (*Lophius piscatorius*).

fish, flies, etc. We find occasional allusions to this pursuit among the Greek and Latin classical writers; it is mentioned several times in the Old Testament, and it was practised by the ancient Egyptians. The oldest work on the subject in English is the *Treatyse of Fysshinge with an Angle*, printed by Wynkyn de Worde in 1496, along with treatises on hunting and hawking, the whole being ascribed to Dame Juliana Berners or Barnes, prioress of a nunnery near St. Alban. Walton's inimitable discourse on angling was first printed in 1653. The chief appliances required by an angler are a rod, line, hooks, and baits. Rods are made of various materials, and of various sizes. The cane rods are lightest; and where fishing-tackle is sold they most commonly have the preference; but in country places the rod is often of the angler's own man-

ufacture. Rods are commonly made in separate joints so as to be easily taken to pieces and put up again. They are made to taper from the butt end to the top, and are usually possessed of a considerable amount of elasticity. In length they may vary from 10 feet to more than double, with a corresponding difference in strength—a rod for salmon being necessarily much stronger than one suited for ordinary brook trout. The *reel*, an apparatus for winding up the line, is attached to the rod near the lower end, where the hand grasps it while fishing. The best are usually made of brass, are of simple construction, and so made as to wind or unwind freely and rapidly. That part of the line which passes along the rod and is wound on the reel is called the *reel line*, and may vary from 20 to 100 yards in length, according to the requirements of the situation; it is usually made of twisted horse hair and silk, or of oiled silk alone. The casting line, which is attached to this, is made of the same materials, but lighter and finer. To the end of this is tied a piece of fine gut, on which the hook, or hooks, are fixed. The casting or gut lines should decrease in thickness from the reel line to the hooks. The size and kind of hook must of course entirely depend on the kind of fish that are angled for. Floats formed of cork, goose and swan quills, etc., are often used to buoy up the hook so that it may float clear of the bottom. For heavy fish or strong streams a cork float is used; in slow water and for lighter fish quill floats. *Baits* may consist of a great variety of materials, natural or artificial. The principal natural baits are worms: common garden worms, brandlings, and red worms, maggots; insects, small fish (as minnows), salmon roe, etc. The artificial flies so much used in angling for trout and salmon are composed of hairs, furs, and wools of every variety. Some angling authorities recommend that the artificial flies should be made to resemble as closely as possible the insects on which the fish is wont to feed, but experience has shown that the most capricious and unnatural combination of feather, fur, etc., have been often successful where the most artistic imitations have failed. Artificial minnows, or other small fish, are also used by way of bait, and are so contrived as to spin rapidly when drawn through the water in order to attract the notice of the fish angled for. Angling, especially with the fly, demands a great deal of skill and practice, the throwing of the line properly being the initial difficulty.

Anglo-Saxons (ang'glō-s a k s'u n s), the name commonly given to the nation or people formed by the amalgamation of the Angles, Saxons, and Jutes, who settled in Britain in the fifth and sixth centuries. The tribes who were thus the ancestors of the bulk of the English-speaking nationalities came from North Germany, where they inhabited the parts about the mouths of the Elbe and Weser, and the first body of them who gained a footing in Britain are said to have landed in 449, and to have been led by Hengist and Horsa. From the preponderance of the Angles the whole country came to be called *Engla-land*, that is, the land of the Angles or English. As an outline of Anglo-Saxon history will be found in the article *England*, we shall here give only some particulars regarding the institutions and customs, language and literature, of the Anglo-Saxons.

The whole Anglo-Saxon community was frequently spoken of as consisting of the *eorls* and the *ceorls*, or the nobles and common freemen. The former were the men of property and position, the latter were the small landholders, handicraftsmen, etc., who generally placed themselves under the protection of some nobleman, who was hence termed their *hláford* or lord. Besides these there was the class of the serfs or slaves (*theówas*) who might be either born slaves or freemen who had forfeited their liberty by their crimes, or whom poverty or the fortune of war had brought into this position. They served as agricultural laborers on their masters' estates, and were mere chattels, as absolutely the property of their master as his cattle.

The king (*cyning*, *cyng*) was at the head of the state; he was the highest of the nobles and the chief magistrate. He was not looked upon as ruling by any divine right, but by the will of the people, as represented by the *witan* (wise men) or great council of the nation. The new king was not always the direct and nearest heir of the late king, but one of the royal family whose abilities and character recommended him for the office. He had the right of maintaining a standing army of household troops, the duty of calling together the witan, and of laying before them public measures, with certain distinctions of dress, dwelling, etc., all his privileges being possessed and exercised by the advice and consent of the *witena-gemót* or parliament (lit. meeting of the wise). Next in rank and dignity to the king were the *ealdormen*, who were the chief witan or counselors, and without whose assent laws could not be made, altered, or abrogated. They were

at the head of the administration of justice in the shires, possessing both judicial and executive authority, and had as their officers the *scír-geréfan* or sheriffs. The ealdorman and the king were surrounded by a number of followers called *thegns* or thanes, who were bound by close ties to their superior. The *scír-geréfa* (shire-reeve or sheriff) was also an important functionary. He presided at the county court along with the ealdorman and bishop, or alone in their absence; and he had to carry out the decisions of the court, levy fines, collect taxes, etc. The shires were divided into hundreds and tithings, the latter consisting of ten heads of families, who were jointly responsible to the state for the good conduct of any member of their body. For the trial and settlement of minor causes there was a hundred court held once a month. The place of the modern parliament was held by the *witena-gemót*. Its members, who were not elected, comprised the æthelings or princes of the blood royal, the bishops and abbots, the ealdormen, the thanes, the sheriffs, etc.

One of the peculiar features of Anglo-Saxon society was the *wergyld*, which was established for the settling of feuds. A sum, paid either in kind or in money, was placed upon the life of every freeman, according to his rank in the state, his birth, or his office. A corresponding sum was settled for every wound that could be inflicted upon his person; for nearly every injury that could be done to his civil rights, his honor, or his domestic peace, etc. From the operation of this principle no one from king to peasant was exempt.

Agriculture, including especially the raising of cattle, sheep, and swine, was the chief occupation of the Anglo-Saxons. The manufactures were naturally of small moment. Iron was made to some extent, also some cloth, and saltworks were numerous. In embroidery and working in gold the English were famous over Europe. There was a considerable trade at London, which was frequented by Normans, French, Flemings, and the merchants of the Hanse towns. The houses were rude structures, but were often richly furnished and hung with fine tapestry. The dress of the people was loose and flowing, composed chiefly of linen, and often adorned with embroidery. The men wore their hair long and flowing over their shoulders. Christianity was introduced among the Anglo-Saxons in the end of the sixth century by St. Augustine, who was sent by Pope Gregory the Great, and became the first Archbishop of Canterbury. Kent, then under King Ethelred, was the first place where it took root, and thence it soon spread over the rest of the country. The Anglo-Saxon Church long remained independent of Rome, notwithstanding the continual efforts of the popes to bring it into uniformity. It was not till the seventh century that this result was brought about by Theodore. Many Anglo-Saxon ecclesiastics were distinguished for learning and ability, the Venerable Bede holding the first place.

The *Anglo-Saxon language*, which is simply the earliest form of English, claims kinship with Dutch, Icelandic, Danish, Swedish, and German, especially with the Low German dialects (spoken in North Germany). The alphabet was substantially the same as that which we still use, except that some of the letters were different in form, while it had separate characters for the sounds of *th* in *thy* and in *thing*. Anglo-Saxon words terminated in a vowel much more frequently than the modern English, and altogether the language is so different that it has to be learned quite like a foreign tongue. Yet notwithstanding the large number of words of Latin or French origin that our language now contains, and the changes it has undergone, its framework, so to speak, is still Anglo-Saxon. Many chapters of the New Testament do not contain more than 4 per cent of non-Teutonic words, and as a whole it averages perhaps 6 or 7.

The existing remains of Anglo-Saxon literature include compositions in prose and poetry, some of which must be referred to a very early period, one or two perhaps to a time before the Angles and Saxons emigrated to England. The most important Anglo-Saxon poem is that called Beowulf, after its hero, extending to more than 6,000 lines. Beowulf is a Scandinavian prince, who slays a fiendish cannibal, after encountering supernatural perils, and is at last slain in a contest with a frightful dragon. Its scene appears to be laid entirely in Scandinavia. Its date is uncertain; parts of it may have been brought over at the emigration from Germany, though in its present form it is much later than this. The poetical remains include a number of religious poems, or poems on sacred themes; ecclesiastical narratives, as lives of saints and versified chronicles; psalms and hymns; secular lyrics; allegories, gnomes, riddles, etc. The religious class of poems was the largest, and of these Cædmon's (about 660) are the most remarkable. His poems consist of loose versions of considerable portions of the

Bible history. Rhyme was little used in Anglo-Saxon poetry, alliteration being employed instead, as in the older northern poetry generally. The style of the poetry is highly elliptical, and it is full of harsh inversions and obscure metaphors.

The Anglo-Saxon prose remains consist of translations of portions of the Bible, homilies, philosophical writings, history, biography, laws, leases, charters, popular treatises on science and medicine, grammars, etc. Many of these were translations from the Latin. The Anglo-Saxon versions of the Gospels, next to the Moeso-Gothic, are the earliest scriptural translations in any modern language. The Psalms are said to have been translated by Bishop Aldhelm (died 709), and also under Alfred's direction; and the Gospel of St. John by Bede; but it is not known who were the authors of the extant versions. A translation of the first seven books of the Bible is believed to have been the work of Ælfric, who was Abbot of Ensham and flourished in the beginning of the eleventh century. We have also eighty homilies from his pen, several theological treatises, a Latin grammar, etc. King Alfred was a diligent author besides being a translator of Latin works. We have under his name a translation of *De Consolatione Philosophie*, of Bœthius, the *Universal History* of Orosius, Bede's *Ecclesiastical History*, the *Pastoral Care* of Gregory the Great, etc. The most valuable to us of the Anglo-Saxon prose writings is the *Anglo-Saxon Chronicle*, so called, a collection of annals recording important events in the history of the country, and compiled in different religious houses. The latest text comes down to 1154. A considerable body of laws remains, as well as a large number of charters. The whole of the literature has never yet been printed.

Angola (an-gō'la), a Portuguese territory in Western Africa, south of the Congo, extending from about lat. 6° S. to lat. 17° S. (area about 500,000 sq. m.; pop. 4,000,000). It is flat and sterile on the coast, but becomes hilly or mountainous and fertile in the interior, and is watered by several streams, of which the Coanza (Kwanza) is the largest. The principal town is the seaport of St. Paul de Loanda, which was long the great Portuguese slave-mart. Exports ivory, palm-oil, coffee, hides, gum, wax, etc.

Angola Pea (*Cajānus indicus*). See *Pigeon Pea.*

Angora (an-gō'ra, anc. *Ancy'ra*), a town in the interior of Asiatic Turkey, 215 miles E. S. E. of Constantinople, with considerable remains of Byzantine architecture, and relics of earlier times, both Greek and Roman, such as the remnants of the Monumentum Ancyranum, raised in honor of the Emperor Augustus. All the animals of this region are long haired, especially the goats (see *Goat*), sheep, and cats. The fabric mohair is manufactured from the hair of the goat and forms an important export; other exports being goatskins, dyestuffs, gums, honey and wax, etc. Estimated pop. 30,000, more than one-third of them Armenians.

Angora Cat, the large and long-haired white variety of the common cat, said to belong originally to Angora.

Angora Goat, a variety of the common goat with long silky hair. See *Goat.*

Angostura (an-gos-tū'ra), or CIUDAD BOLIVAR, a city of Venezuela, capital of the province of Bolivar, on the Orinoco, about 225 miles above its mouth, with governor's residence, a college, a handsome cathedral, and a considerable trade, steamers and sailing vessels ascending to the town. Exports: gold, cotton, indigo, tobacco, coffee, cattle, etc.; imports: manufactured goods, wines, flour, etc. Pop. about 10,000.

Angostura Bark, the aromatic bitter medicinal bark obtained chiefly from *Galipēa trifoliata*, a tree 10 to 20 feet high, growing in the northern regions of South America; nat. order *Rutaceæ*. The bark

Angostura-bark Tree.

is valuable as a tonic and febrifuge, and is also used for a kind of bitters. From this bark being adulterated, indeed sometimes entirely replaced, by the poisonous bark of *Strychnos Nux Vomica*, its use as a medicine has been almost given up.

Angoulême (ån-gō-lām), an ancient town of Western France,

capital of dep. Charente, on the Charente, 60 miles N. N. E. of Bordeaux, on the summit of a rocky hill. It has a fine old cathedral, a beautiful modern town-hall, a lyceum, public library, natural history museum, hospital, lunatic asylum, etc. There are manufactures of paper, woolens, linens, distilleries, sugar-works, tanneries, etc. Pop. 38,211.

Angra (ăn'grä), a seaport of Terceira, one of the Azores, with the only convenient harbor in the whole group. It has a cathedral, a military college and arsenal, etc., and is the residence of the governor-general of the Azores, and of the foreign consuls. Pop. 10,788.

Angra Pequena (ăn'grà pe-kā'nà; Port. 'little bay'), a bay on the west of Namaqualand, S. Africa, where the German commercial firm Lüderitz in 1883 acquired a strip of territory and established a trading station. In 1884, notwithstanding some weak protests of the British, Germany took under her protection the whole coast territory from the Orange River to 26° S. lat., and soon after extended the protectorate to the Portuguese frontier, but not including the British settlement of Walfisch Bay.

Angri (ăn'grē), a town of Southern Italy, 12 m. N. W. of Salerno, in the center of a region which produces grapes, cotton, and tobacco in great quantities. Pop. 11,281.

Anguilla (an-gwil'la). See *Eel.*

Anguilla (ang-gil'a), or SNAKE ISLAND, one of the British West India Islands, 60 m. N. W. of St. Kitts; about 20 m. long, with a breadth varying from 3 to 1¼ m.; area, 35 sq. m. There is a saline lake in the center, which yields a large quantity of salt. Pop. 3890.

Anguis (ang'gwis). See *Blind-worm.*

Angus (ang'gus), ancient name of Forfarshire, Scotland.

Anhalt (ăn'hält), a state of North Germany, lying partly in the plains of the Middle Elbe, and partly in the valleys and uplands of the Lower Harz, and almost entirely surrounded by Prussia; area, 906 square miles. All sorts of grain, wheat especially, are grown in abundance; also flax, rape, potatoes, tobacco, hops, and fruit. Excellent cattle are bred. The inhabitants are principally occupied in agriculture, though there are some iron-works and manufactures of woolens, linens, beet-sugar, tobacco, etc. The dukes of Anhalt trace their origin to Bernard (1170–1212), son of Albert the Bear. In time the family split up into numerous branches, and the territory was latterly held by three dukes (Anhalt-Köthen, Anhalt-Bernburg, and Anhalt-Dessau). In 1863 the Duke of Anhalt-Dessau became sole heir to the three duchies. The united principality formed a duchy in the German Empire. Constituted a free state in the German Federated Republic July 18, 1919. Pop. 331,128, almost all Protestants. Chief towns: Dessau (the capital), Bernburg, Köthen and Zerbst.

Anholt (an'holt), an island belonging to Denmark, in the Cattegat, midway between Jutland and Sweden, 7 m. long, 4½ broad, largely covered with drift-sand, and surrounded by dangerous banks and reefs. Pop. about 200.

Anhydride (an-hī'drīd), one of a class of chemical compounds, which may be regarded as representing an acid minus the water in its composition. They were formerly called *anhydrous acids.*

Anhydrite (an-hī'drīt), anhydrous sulphate of calcium, a mineral presenting several varieties of structure and color. The *vulpinite* of Italy possesses a granular structure, resembling a coarse-grained marble, and is used in sculpture. Its color is grayish white, intermingled with blue.

Ani (ä'nē), a ruined city in Russian Armenia, formerly the residence of the Armenian dynasty of the Bagratidæ, having in the eleventh century a pop. of 100,000; in the thirteenth century destroyed by the Mongols.

Aniene (à-nē-ā'nā). See *Anio.*

Aniline (an'i-lin), a substance of importance as the basis of a number of brilliant and durable dyes. It is found in small quantities in coal-tar, but the aniline of commerce is obtained from benzene or benzole, a constituent of coal-tar, consisting of hydrogen and carbon. Benzene, when acted on by nitric acid, produces nitrobenzene; and this substance again, when treated with nascent hydrogen, generally produced by the action of acetic acid upon iron filings or scraps, yields aniline. It is a colorless, oily liquid, somewhat heavier than water, with a peculiar vinous smell and a burning taste. Its name is derived from *anil*, the Portuguese and Spanish name for indigo, from the dry distillation of which substance it was first obtained by the chemist Unverdorben in 1826. When acted on by certain chemicals, such as arsenic, bichromate of potassium, etc., aniline produces a great variety of compounds, many of which are possessed of very beau-

tiful colors, and are known by the names of aniline purple, aniline green, rosëine, violine, bleu de Paris, magenta, etc. The manufacture of these aniline or coal-tar dyes as a branch of industry was introduced in 1856 and has since grown large.

Anilism (an'i-lizm), aniline poisoning, a name given to the aggregate of symptoms which often show themselves in those employed in aniline works, resulting from the inhalation of aniline vapors. It may be either acute or chronic. In a slight attack of the former kind, the lips, cheeks, and ears become of a bluish color, and the person's walk may be unsteady; in severe cases there is loss of consciousness. Chronic anilism is accompanied by derangement of the digestive organs and of the nervous system, headaches, eruptions on the skin, muscular weakness, etc.

Animal (an'i-mal), an organized and sentient living being. Life in the earlier periods of natural history was attributed almost exclusively to animals. With the progress of science, however, it was extended to plants. In the case of the higher animals and plants there is no difficulty in assigning the individual to one of the two great kingdoms of organic nature, but in their lowest manifestations the vegetable and animal kingdoms are brought into such immediate contact that it becomes almost impossible to assign them precise limits, and to say with certainty where the one begins and the other ends. From *form* no absolute distinction can be fixed between animals and plants. Many animals, such as the sea-shrubs, sea-mats, etc., so resemble plants in external appearance that they were, and even yet popularly are, looked upon as such. With regard to *internal structure* no line of demarkation can be laid down, all plants and animals being, in this respect, fundamentally similar; that is, alike composed of molecular, cellular, and fibrous tissues. Neither are the chemical characters of animal and vegetable substances more distinct. Animals contain in their tissues and fluids a larger proportion of nitrogen than plants, while plants are richer in carbonaceous compounds than the former. In some animals, moreover, substances almost exclusively confined to plants are found. Thus the outer wall of Sea-squirts contains *cellulose*, a substance largely found in plant-tissues; while *chlorophyll*, the coloring-matter of plants, occurs in Hydra and many other lower animals. *Power of motion*, again, though broadly distinctive of animals, cannot be said to be absolutely characteristic of them. Thus many animals, as oysters, sponges, corals, etc., in their mature condition are rooted or fixed, while the embryos of many plants, together with numerous fully developed forms, are endowed with locomotive power by means of vibratile, hair-like processes called cilia. The distinctive points between animals and plants which are most to be relied on are those derived from the *nature and mode of assimilation of the food*. Plants feed on *inorganic matters* consisting of water, ammonia, carbonic acid, and mineral matters. They can take in only food which is presented to them in a *liquid* or *gaseous* state. The exceptions to these rules are found chiefly in the case of plants which live *parasitically* on other plants or on animals, in which cases the plant may be said to feed on organic matters, represented by the juices of their hosts. Animals, on the contrary, require *organized* matters for food. They feed either upon plants or upon other animals. But even carnivorous animals can be shown to be dependent upon plants for subsistence; since the animals upon which Carnivora prey are in their turn supported by plants. Animals, further, can subsist on *solid* food in addition to liquids and gases; but many animals (such as the tapeworms) live by the mere imbibition of fluids which are absorbed by their tissues, such forms possessing no distinct digestive system. Animals require a due supply of *oxygen gas* for their sustenance, this gas being used in respiration. Plants, on the contrary, require *carbonic acid*. The animal exhales or gives out carbonic acid as the part result of its tissue-waste, while the plant taking in this gas is enabled to decompose it into its constituent carbon and oxygen. The plant retains the former for the uses of its economy, and liberates the oxygen, which is thus restored to the atmosphere for the use of the animal. All animals possess a certain amount of heat or temperature which is necessary for the performance of vital action. The only classes of animals in which a constantly-elevated temperature is kept up are birds and mammals. The bodily heat of the former varies from 100° F. to 112° F., and of the latter from 96° F. to 104° F. The mean or average heat of the human body is about 99° F., and it never falls much below this in health. The animals lower in organization than birds are named 'cold-blooded,' this term meaning in its strictly physiological sense that their temperature is usually that of the medium in which they live, and that it varies with that of the surrounding medium. 'Warm-blooded' animals, on the contrary, do not exhibit such variations.

but mostly retain their normal temperature in any atmosphere. The cause of the evolution of heat in the animal body is referred to the union (by a process resembling ordinary combustion) of the carbon and hydrogen of the system with the oxygen taken in from the air in the process of respiration. The details of animal organization will be treated under appropriate headings.

Animal Chemistry, the department of organic chemistry which investigates the composition of the fluids and the solids of animals, and the chemical action that takes places in animal bodies. There are four elements, sometimes distinctively named *organic elements*, which are invariably found in living bodies,—viz., carbon, hydrogen, oxygen, and nitrogen. To these may be added, as frequent constituents of the human body, sulphur, phosphorus, lime, sodium, potassium, chlorine, and iron. The four organic elements are found in all the fluids and solids of the body. Sulphur occurs in blood and in many of the secretions. Phosphorus is also common, being found in nerves, in the teeth, and in fluids. Chlorine occurs in almost all parts of the body; lime is found in bone, in the teeth, and in the secretions; iron occurs in the blood, in urine, and in bile; and sodium, like chlorine, is of common occurrence. Potassium occurs in muscles, in nerves, and in the blood-corpuscles. Minute quantities of copper, silicon, manganese, lead, and lithium are also found in the human body. The compounds formed in the human organism are divisible into the organic and inorganic. The most frequent of the latter is water, of which two-thirds (by weight) of the body is composed. The organic compounds may, like the *foods* from which they are formed, be divided into the nitrogenous and non-nitrogenous. Of the former the chief are albumen (found in blood, lymph, and chyle), casein (found in milk), myosin (in muscle), gelatin (obtained from bone), and others. The non-nitrogenous compounds are represented by organic acids, such as formic, acetic, butyric, stearic, etc.; by animal starches, sugars; and by fats and oils, as stearin and olein.

Animalcule (an-i-mal'kūl), a general name given to many forms of animal life from their minute size. We thus speak of the Infusorian Animalcules among the Protozoa, of the Rotifera or Wheel Animalcules, etc., but the term is not now used in zoölogy in any strict significance. nor is it employed in classification.

Animal Heat. See *Animal.*

Animal Magnetism. See *Mesmerism.*

Animals, Cruelty to, an offense against which societies have been formed and laws passed in various countries. Societies for prevention of cruelty to animals are in operation in all the states of the American Union. The first was chartered in New York in 1866, with Henry Bergh, president, whose efforts to extend its powers were untiring. See also *Vivisection.*

Animal Worship, a practice found to prevail, or to have prevailed, in the most widely distant parts of the world, both the Old and the New, but nowhere to such an amazing extent as in ancient Egypt, notwithstanding its high civilization. Nearly all the more important animals found in the country were regarded as sacred in some part of Egypt, and the degree of reverence paid to them was such that throughout Egypt the killing of a hawk or an ibis, whether voluntary or not, was punished with death. The worship, however, was not, except in a few instances, paid to them as actual deities. The animals were merely regarded as sacred to the deities, and the worship paid to them was symbolical.

An'ima Mun'di (L., 'the soul of the world'), a term applied by some of the older philosophers to the ethereal essence or spirit supposed to be diffused through the universe, organizing and acting throughout the whole and in all its different parts; a theory closely allied to *Pantheism.*

Anime (an'i-mā), a resin supposed to be obtained from the trunk of an American tree (*Hymenæa Courbaril*). It is of a transparent amber color, has a light, agreeable smell, and is soluble in alcohol. It strongly resembles copal, and, like it, is used in making varnishes. Also a name of other resins.

Animism (an'im-izm), the system of medicine propounded by Stahl, and based on the idea that the soul (*anima*) is the seat of life. In modern usage the term is applied to express the general doctrine of souls and other spiritual beings, and especially to the tendency, common among savage races, to explain all the phenomena in nature not due to obvious natural causes by attributing them to spiritual agency. Among the beliefs most characteristic of animism is that of a human apparitional soul, bearing the form and appearance of the body, and living after death a sort of semi-human life.

Anio (ä'ne-o; now *Aniēne* or *Teverōne*), a river in Italy, a tributary of the Tiber, which it enters from the east a short distance above Rome, renowned for the natural beauties of the valley through which it flows, and for the remains of ancient buildings there situated. Its beautiful cascade at Tivoli is celebrated by the poets.

Anise (an'is; *Pimpinella anīsum*), an annual plant of the natural order Umbelliferæ, a native of the Levant, and cultivated in Spain, France, Italy, Malta, etc., whence the fruit, popularly called *aniseed*, is imported. This fruit is ovate, with ten narrow ribs, between which are oil-vessels. It has an aromatic smell, and is largely employed to flavor liqueurs (aniseed or anisette), sweetmeats, etc. *Star-anise* is the fruit of an evergreen Asiatic tree (*Illicium anisātum*) of the natural order Magnoliaceæ, and is brought chiefly from China. Its flavor is similar to that of anise, and it is used for the same purposes. An essential oil is obtained from both kinds of anise, and is used in the preparation of cordials, for scenting soaps, etc.

Aniseed. See *Anise.*

Anisette (an'i-set), a liqueur flavored with spirit of anise; also called *aniseed.*

Anjou (åṅ-zhö), an ancient province of France, now forming the department of Maine-et-Loire, and parts of the departments of Indre-et-Loire, Mayenne, and Sarthe; area, about 3,000 sq. miles. In 1060 the province passed into the hands of the house of Gatinais, of which sprang Count Godfrey V, who, in 1127, married Matilda, daughter of Henry I of England, and so became the ancestor of the Plantagenet kings. Anjou remained in the possession of the English kings up to 1204, when John lost it to the French king Philip Augustus. In 1246 Louis IX bestowed this province on his son Charles; but in 1328 it was reunited to the French crown. John I raised it to the rank of a ducal peerage, and gave it to his son Louis. Subsequently it remained separate from the French crown till 1480, when it fell to Louis XI.

Ankarström (åṅ'kår-streum), Jan Jakob, the murderer of Gustavus III of Sweden, was born about 1762, and was at first a page in the Swedish court, afterwards an officer in the royal body-guards. He was a strenuous opponent of the sovereign's measures to restrict the priviliges of the nobility, and joined Counts Horn and Ribbing and others in a plot to assassinate Gustavus. The assassination took place on the 15th March, 1792. Ankarström was tried, tortured, and executed in April, dying boasting of his deed.

Anker (ang'ker), an obsolete measure used in Britain for spirits, beer, etc., containing 8½ imperial gallons. A measure of similar capacity was used in Germany and elsewhere in Europe.

Anklam (än'kläm), a town in Prussia, province of Pomerania, 47 miles N. W. of Stettin, on the river Peene, which is here navigable. Shipbuilding, woolen and cotton manufactures, soap-boiling, tanning, etc., are carried on. Pop. 14,602.

Ankle (ang'kl). See *Foot.*

Ankobar (an-kō'bar), or Ankoiber, a town in Abyssinia, capital of Shoa, on a steep conical hill 8,200 feet high. Pop. 6,000.

Ankylosis (ang'ki-lō-sis), or Anchylo'sis, stiffness of the joints caused by a more or less complete coalescence of the bones through ossification, often the result of inflammation or injury. False ankylosis is stiffness of a joint when the disease is not in the joint itself, but in the tendinous and muscular parts by which it is surrounded.

Anna (an'a), an Anglo-Indian money of account, the sixteenth part of a rupee, and of the value of three cents.

Annaberg (än'nä-berg), a town in Saxony, 47 miles S. W. of Dresden. Mining (for silver, cobalt, iron, etc.) is carried on, and there are manufactures of lace, ribbons, fringes, buttons, etc. Pop. (1905) 16,811.

Anna Comnena (com-ne'na), daughter of Alexius I Comnenus, Byzantine emperor. She was born 1083, and died 1148. After her father's death she endeavored to secure the succession to her husband, Nicephorus Briennius, but was baffled by his want of energy and ambition. She wrote (in Greek) a life of her father Alexius, which, in the midst of much fulsome panegyric, contains some valuable and interesting information. She forms a character in Sir Walter Scott's *Count Robert of Paris.*

Anna Ivanovna (ē-vä-nov'-nä), Empress of Russia; born in 1693, the daughter of Ivan, the elder half-brother of Peter the Great. She was married in 1710 to the Duke of Courland, in the following year was left a widow, and in 1730 ascended the throne of the czars on the condition proposed by the senate, that she would limit the absolute power of the czars, and

do nothing without the advice of the council composed of the leading members of the Russian aristocracy. But no sooner had she ascended the throne than she declared her promise null, and proclaimed herself autocrat of all the Russias. She chose as her favorite Ernest Johann Biren or Biron, who was soon all powerful in Russia, and ruled with great severity. Several of the leading nobles were executed, and many thousand men exiled to Siberia. In 1737 Anna forced the Courlanders to choose Biren as their duke, and nominated him at her death regent of the empire during the minority of Prince Ivan (of Brunswick). Anna died in 1740. See *Biren*.

Annals (an'alz), a history of events in chronological order, each event being recorded under the year in which it occurred. The name is derived from the first annual records of the Romans, which were called *annāles pontificum* or *annāles maxima*, drawn up by the *pontifex maximus* (chief pontiff). The practice of keeping such annals was afterwards adopted also by various private individuals, as by Fabius Pictor, Calpurnius Piso, and others. The name hence came to be applied in later times to historical works in which the matter was treated with special reference to chronological arrangement, as to the Annals of Tacitus.

Annam (an-nam'). See *Anam*.

Annamaboe (ä-mä-mä-bō'), a seaport in Western Africa, on the Gold Coast, 10 miles east of Cape Coast Castle, with some trade in gold dust, ivory, palm-oil, etc. Pop. 5000.

Annan (an'nan), a royal and parliamentary burgh in Scotland, on the Annan, a little above its entrance into the Solway Firth, one of the Dumfries district of burghs. Pop. 4219.—The river ANNAN is a stream 40 miles long running through Dumfriesshire.

Annapolis (an-nap'o-lis), the capital of Maryland, on the Severn, near its mouth in Chesapeake Bay, 40 miles E. of Washington. It contains a college (St. John's), a state-house, and the United States naval academy, which was established here in 1845. Oyster-packing is the chief industry. Pop. 11,214. See *Naval Academy*.

Annapolis Convention, a convention of the new-formed States held in Annapolis, Maryland, Sept. 11, 1786. Representatives of the States of Delaware, New Jersey, New York, Pennsylvania and Virginia attended. Since only a few of the States attended, the Convention agreed to summon another convention of all the states to consider means of making 'the Constitution of the Federal Government adequate to the exigencies of the Union.' The great convention of Philadelphia, in 1787 (see *United States*) resulted.

Annapolis Royal a small town in Nova Scotia, on an inlet of the Bay of Fundy, a tidal port, open all the year. It is the oldest European settlement in this part of America, dating from 1604. Settled by the French it was taken by the English during the colonial wars and renamed after Queen Anne. It is in a famous apple district, and there are planing mills, furniture factories, etc. There is hydro-electric power. Pop. 1020.

Ann Arbor, a city, county seat of Washtenaw Co., Mich., on Huron River, 38 miles W. of Detroit. Seat of the University of Michigan, University School of Music, and other educational institutions. It has many manufactures, including broaches and broaching machines, silo fillers and hay presses, brass and steel balls, balers, stamped products, wire fences, toys, castings, trailers, furniture, flour, etc. It has 9 parks and playgrounds and 3 public libraries. Pop. (1910) 14,817; (1920) 19,516.

Annates (an'nāts), a year's income claimed for many centuries by the pope on the death of any bishop, abbot, or parish priest, to be paid by his successor. In England they were at first paid to the Archbishop of Canterbury, but were afterwards appropriated by the popes. In 1532 the Parliament gave them to the crown; but Queen Anne restored them to the church by applying them to the augmentation of poor livings.

Annatto, ARNOTTO (a-not-tō), an orange-red coloring matter, obtained from the pulp surrounding the seeds of *Bixa Orellāna*, a shrub native to tropical America, and cultivated in Guiana, St. Domingo, and the East Indies. It is sometimes used as a dye for silk and cotton goods, though it does not produce a very durable color, but it is much used in medicine for tinting plasters and ointments, and to a considerable extent by farmers for giving a rich color to cheese.

Anne (an), Queen of Great Britain and Ireland, was born at Twickenham, near London, 6th February, 1664. She was the second daughter of James II, then Duke of York. In 1683 she was married to Prince George, brother to King Christian V of Denmark. On the arrival of the Prince of Orange in 1688, Anne wished to remain with her father; but she was prevailed upon by Lord

Churchill (afterwards Duke of Marlborough) and his wife to join the triumphant party. After the death of William III in 1702 she ascended the English throne. Her character was essentially weak, and she was governed first by Marlborough and his wife, and afterwards by Mrs. Masham. Most of the principal events of her reign are connected with the war of the Spanish Succession. The only important acquisition that England made by it was Gibraltar, which was captured in 1704. Another very important event of this reign was the union of England and Scotland under the name of Great Britain, which was accomplished in 1707. She seems to have long cherished the wish of securing the succession to her brother James, but this was frustrated by the internal dissensions of the cabinet. Grieved at the disappointment of her secret wishes, she fell into a state of weakness and lethargy, and died, July 20, 1714.

Anne (OF AUSTRIA), daughter of Philip III of Spain, was born at Madrid in 1601, and in 1615 was married to Louis XIII of France. Richelieu fearing the influence of her foreign connections, did everything he could to humble her. In 1643 her husband died, and she was left regent, but placed under the control of a council. But the Parliament overthrew this arrangement, and entrusted her with full sovereign rights during the minority of her son, Louis XIV. She, however, brought upon herself the hatred of the nobles by her boundless confidence in Cardinal Mazarin, and was forced to flee from Paris during the wars of the Fronde. She ultimately quelled all opposition, and was able in 1661 to transmit to her son unimpaired the royal authority. She spent the remainder of her life in retirement, and died January 20, 1666.

Annealing (an-ēl'ing), a process to which many articles of metal and glass are subjected after making, in order to render them more tenacious, and which consists in heating them and allowing them to cool slowly. When the metals are worked by the hammer, or rolled into plates, or drawn into wire, they acquire a certain amount of brittleness, which destroys their usefulness, and has to be remedied by annealing. In working tool steel the metal is made workable by annealing. It is particularly employed in glass-houses, and consists in putting the glass vessels, as soon as they are formed and while they are yet hot, into a furnace or oven, in which they are suffered to cool gradually. The toughness is greatly increased by cooling the articles in oil.

Annecy (án-sē), an ancient town in France, department of Haute-Savoie, situated on the Lake of Annecy, 21 miles S. of Geneva; contains a cathedral and a ruinous old castle, once the residence of the counts of Genevois; manufactures of cotton, leather, paper, and hardware. Pop. 10,763.—The lake is about 9 miles long and 2 broad.

Annelida (a-nel'-i-da), an extensive division or class of Annulosa or articulate animals, so called because their bodies are formed of a great number of small rings. The earthworm, the lobworm, the nereis, and the leech belong to this division.

Annelida.

1, Leech (*Sanguisuga officinalis*). 2, *Syllis monilaris*. 3, Portion of same.

Anniston (an'nis-ton), a city, county seat of Calhoun county, Alabama, 56 miles E. N. E. of Birmingham. Center of the cast-iron pipe industry, it has large iron works, blast furnaces, ferromanganese plant, cotton mills, etc. Hydroelectric power. Pop. (1920) 17,734.

Annobon (an-no-bōn'), or ANNOBOM, a beautiful Spanish island of Western Africa, south of the Bight of Biafra, about 4 miles long by 2 miles broad, and rising abruptly to the height of 3,000 feet, richly covered with vegetation. Pop. about 3000.

Annonay (ån-o-nā), a town in Southern France, department of Ardèche, 37 miles S. S. W. of Lyons, in a picturesque situation. It is the most important town of Ardèche, manufacturing paper and glove leather to a large extent, also cloth, felt, silk stuffs, gloves, hosiery, etc. There is an obelisk in memory of Joseph Montgolfier of balloon fame, a native of the town. Pop. (1906) 15,403.

Annotto. See *Annatto*.

Annual (an'ū-al), in botany, a plant that springs from seed, grows up, produces seed, and then dies, all within a single year or season.

An'nual, in literature, the name given to a class of gift-books which flourished between 1820 and 1860 and were distinguished by great magnificence both of binding and illustration. Their contents were chiefly prose tales and ballads, lyrics and other poetry. Annuals to-day are usually year-books of practical information.

Annuity (a-nū'i-ti), a sum of money paid annually to a person, and continuing either a certain number

of years, or for an uncertain period, to be determined by a particular event, as the death of the recipient or annuitant, or that of the party liable to pay the annuity; or the annuity may be perpetual. The payments are made at the end of each year, or at other periods. The rules and principles by which the present value of an annuity is to be computed have been the subjects of careful investigation. The present value of an annuity for a limited period is a sum which, if put at interest, will at the end of that period give an amount equal to the sum of all the payments of the annuity and interest; and, accordingly, if it be proposed to invest a certain sum of money in the purchase of an annuity for a given number of years the comparative value of the two may be precisely estimated, the rate of interest being given. But annuities for uncertain periods, and particularly life annuities, are more frequent, and the value of the annuity is computed according to the probable duration of the life by which it is limited. If a person having a certain capital, and intending to spend this capital and the income of it during his own life, could know precisely how long he should live, he might lend this capital at a certain rate during his life, and by taking every year, besides the interest, a certain amount of the capital, he might secure the same annual amount for his support during his life in such manner that he should have the same sum to spend every year, and consume precisely his whole capital during his life. But since he does not know how long he is to live he agrees with an annuity office to take the risk of the duration of his life, and agree to pay him a certain annuity during his life in exchange for the capital which he proposes to invest in this way. The probable duration of his life, therefore, becomes a subject of computation; and for the purpose of making this calculation tables of longevity are made by noting the proportions of deaths at certain ages in the same country or district. In Great Britain the government grants annuities, but in the United States the granting of annuities is confined to private companies or corporations. The following are the approved rates of a well-managed company: In consideration of $1000 paid to a company the annuity granted to a male aged 40 would be $57.64; aged 45, $62.77; aged 50, $69.59; aged 55, $78.68; aged 60, $90.99; aged 65, $107.87; aged 70, $131.23; aged 75, $160.00; aged 80, $183.49. The purchase of annuities, as a system, has never gained much foothold in America—the endowment plan of life insurance, by which after the lapse of a term of years the insured receives a sum in bulk, being preferred.

Annuloida (an-ū-loi′da), in some modern zoölogical classifications, a division (sub-kingdom) of animals, including the Rotifera, Scolecida (tapeworms, etc.), all which are more or less ring-like in appearance, and the Echinodermata, whose embryos show traces of annulation.

Annulosa (an-ū-lō′sa), a division (sub-kingdom) of animals regarded by some as synonymous with the Arthropoda or Articulata; according to other systematists, including both the Articulata and Annulata or worms.

Annunciation (a-nun-shi-ā′ s h u n), the declaration of the angel Gabriel to the Virgin Mary informing her that she was to become the mother of our Lord.—*Annunciation* or *Lady Day* is a feast of the church in honor of the annunciation, celebrated on the 25th of March.—The Italian order of *Knights of the Annunciation* was instituted by Amadeus VI, Duke of Savoy, in 1360. The king is always grand-master. The knights must be of high rank, and must already be members of the order of St. Mauritius and St. Lazarus. —There are two orders of *nuns of the Annunciation*, one originally French, founded in 1501 by Joanna of Valois, the other Italian, founded in 1604 by Maria Vittoria Fornari of Genoa.

Anoa (an′o-a), an animal (*Anoa depressicornis*) closely allied to the buffalo, about the size of an average sheep, readily domesticated, inhabiting the rocky and mountainous localities of the island of Celebes. The horns are straight, thick at the root, and set nearly in a line with the forehead.

Anobium (a-nō′bi-um), a genus of coleopterous insects, the larvæ of which often do much damage by their boring into old wood, including several known by the name of *death-watch*. *A. striātum*, a common species, when frightened, is much given to feigning death.

Anode (an′ōd; Gr. *ana*, up, *hodos*, way), the positive pole of the voltaic current, being that part of the surface of a chemically decomposing body which the electric current enters; opposed to *cathode* (Gr. *kata*, down, *hodos*, way); the way by which it departs.

Anodon (an′o-don), ANODON′TA, a genus of lamellibranchiate bivalves, including the fresh-water mussels, without or with very slight hinge-teeth. See *Mussel*.

Anodyne (an′o-dīn), a medicine, such as an opiate or narcotic, which allays pain.

Anointing (a-noint′ing), rubbing the body or some part of it with oil, often perfumed. From time immemorial the nations of the East have been in the habit of anointing themselves for the sake of health and beauty. The Greeks and Romans anointed themselves after the bath. Wrestlers anointed themselves in order to render it more difficult for their antagonists to get hold of them. In Egypt it seems to have been common to anoint the head of guests when they entered the house where they were to be entertained, as shown in the cut. In the Mosaic law a sacred character was attached to the anointing of the garments of the priests and things belonging to the ceremonial of worship. The Jewish priests and kings were anointed when inducted into office, and were called the *anointed of the Lord*, to show that their persons were sacred and their office from God. In the Old Testament also the prophecies respecting the Redeemer style him *Messias*, that is, the *Anointed*, which is also the meaning of his Greek name Christ. The custom of anointing still exists in the Roman Catholic Church in the ordination of priests and the confirmation of believers and the sacrament of extreme unction. The ceremony is also frequently a part of the coronation of kings.

Egyptian anointing a Guest.

Anomalure (a-nom′a-lūr; *Anomalūrus*), a genus of rodent animals inhabiting the west coast of Africa, resembling the flying-squirrels, but having the under surface of the tail furnished for some distance from the roots with a series of large horny scales, which, when pressed against the trunk of a tree, may subserve the same purpose as those instruments with which a man climbs up a telegraph pole to set the wires.' They are called also scale-tails, or scale-tailed squirrels, but some authorities class them with the porcupines rather than the squirrels. There are several species of them, but little is known of their habits.

Anomaly (a-nom′a-li), in astronomy, the angle which a line drawn from a planet to the sun has passed through since the planet was last at its perihelion or nearest distance to the sun. The *anomalistic year* is the interval between two successive times at which the earth is in perihelion, or 365 days 6 hours 13 minutes 45 seconds. In consequence of the advance of the earth's perihelion among the stars in the same direction as the earth's motion and of the precession of the equinoxes, which carries the equinoxes back in the opposite direction to the earth's motion, the anomalistic year is longer than the sidereal year, and still longer than the tropical or common year.

Anomura (a-no-mū′ra), a section of the crustaceans of the order Decapoda, with irregular tails not formed to assist in swimming, including the hermit-crabs and others.

Anona (a-nō′na), a genus of plants, the type of the nat. order Anonaceæ. *A. squamōsa* (sweet-sop) grows in the West Indian Islands, and yields an edible fruit having a thick, sweet, luscious pulp. *A. muricāta* (sour-sop) is cultivated in the West and East Indies; it produces a large pear-shaped fruit, of a greenish color, containing an agreeably slightly acid pulp. The genus produces other edible fruits, as the common custard-apple or bullock's heart, from *A. reticulāta*, and the cherimoyer of Peru, from *A. Cherimolia*.

Anona or Sour-sop (*Anona muricata*).

Anonaceæ (a-nō-nā′ce-ē), a natural order of trees and shrubs, having simple, alternate leaves, destitute of stipules, by which character they are distinguished from the Magnoliaceæ, to which they are otherwise closely allied. They are mainly tropical plants of the Old and the New World, and are generally aromatic. See *Anona*.

Anonymous (a-non′i-mus), literally 'without name,' applied to anything which is the work of a person whose name is unknown or who keeps his name secret. *Pseudonym* is a term used for an assumed name. The knowledge of the anonymous and pseudonymous literature is indispensable to the bibliographer, and large dictionaries giving the titles and

writers of such works have been published.

Anoplotherium (an-a-plō-thē'ri-um), an extinct genus of the Ungulata or Hoofed Quadrupeds, forming the type of a distinct family, which were in many respects intermediate between the swine and the true ruminants. These animals were pig-like in form, but possessed long tails, and had a cleft hoof, with two rudimentary toes. The remarkable dental development, which differs from all other ungulates extinct or recent, consists of six incisors, two canines, eight premolars, and six molars, present in each jaw, the series being continuous. *A. commūne*, from the Eocene rocks, is a familiar species.

Anoplura (an-o-plū'ra), an order of apterous insects, of which the type is the genus *Pediculus* or louse.

Anopshehr. See *Anupshahr.*

Anorexia. See *Appetite.*

Anosmia (an-os'mi-a), a disease consisting in a diminution or destruction of the power of smelling, sometimes constitutional, but most frequently caused by strong and repeated stimulants, as snuff, applied to the olfactory nerves.

Anoura. See *Anura.*

Anquetil-Duperron (ånk-tēl-dū-pā-ron), ABRAHAM HYACINTHE, a French orientalist, born in 1731, died in 1805. He studied theology for some time, but soon devoted himself to the study of Hebrew, Arabic, and Persian. His zeal for the Oriental languages induced him to set out for India, where he prevailed on some of the Parsee priests to instruct him in the Zend and Pehlevi and to give him some of the Zoroastrian books. In 1762 he returned to France with a valuable collection of MSS. In 1771 he published his *Zend-Avesta*, a translation of the *Vendidad*, and other sacred books, which excited great sensation. Among his other works are *L'Inde en Rapport avec l'Europe* (1790), and a selection from the *Vedas*. His knowledge of the Oriental languages was by no means exact.

Ansbach. See *Anspach.*

Anselm (ån'selm) ST., a celebrated Christian philosopher and theologian, born at Aosta, in Piedmont, in 1033; died at Canterbury 1109. At the age of twenty-seven (1060) he became a monk at Bec, in Normandy, whither he had been attracted by the celebrity of Lanfranc. Three years later he was elected prior, and in 1078 he was chosen abbot, which he remained for fifteen years. During this period of his life he wrote his first philosophical and religious works; the dialogues on Truth and Free-will, and the treatises *Monologion* and *Proslogion;* and at the same time his influence made itself so felt among the monks under his charge that Bec became the chief seat of learning in Europe. In 1093 Anselm was offered by William Rufus the archbishopric of Canterbury, and accepted it, though with great reluctance, and with the condition that all the lands belonging to the see should be restored. William II soon quarreled with the archbishop, who would show no subservience to him, and would persist in acknowledging Pope Urban in opposition to the antipope Clement. William ultimately had to give way, acknowledging Urban and conferring the pallium upon Anselm. The king became his bitter enemy, however, and so great were Anselm's difficulties that in 1097 he set out for Rome to consult with the pope. Urban received him with great distinction, but did not venture really to take the side of the prelate against the king, though William had refused to receive Anselm again as archbishop, and had seized on the revenues of the see of Canterbury, which he retained till his death in 1100. Anselm accordingly remained abroad, where he wrote most of his celebrated treatise on the atonement, entitled, *Cur Deus Homo* ('Why God was made Man;' translated into English, Oxford, 1858). When William was succeeded by Henry I Anselm was recalled; but Henry insisted that he should submit to be reinvested in his see by himself, although the popes claimed the right of investing for themselves alone. Much negotiation followed, and Henry did not surrender his claims till 1107, when Anselm's long struggle on behalf of the rights of the church came to an end. Anselm was a great scholar, a deep and original thinker, and a man of the utmost saintliness and piety. The chief of his writings are the *Monologion*, the *Proslogion*, and the *Cur Deus Homo*. The first is an attempt to prove inductively the existence of God by pure reason without the aid of Scripture or authority; the second is an attempt to prove the same by the deductive method; the *Cur Deus Homo* is intended to prove the necessity of the incarnation. Among his numerous other writings are more than 400 letters. His life was written by his domestic chaplain and companion, Eadmer, a monk of Canterbury.

Ansgar, or ANSKAR (an'skår), called the *Apostle of the North*, was

born in 801 in Picardy, and he took the monastic vows while still in his boyhood. In the midst of many difficulties he labored as a missionary in Denmark and Sweden, dying in 864 or 865, with the reputation of having undertaken, if not the first, the most successful attempts for the propagation of Christianity in the North.

An'son, George, Lord, a celebrated English navigator; born 1697, died 1762. He entered the navy at an early age and became a commander in 1722, and captain in 1724. In 1740 he was made commander of a fleet sent to the South Sea, directed against the trade and colonies of Spain. The expedition consisted of five men-of-war and three smaller vessels, which carried 1400 men. After much suffering and many stirring adventures he reached the coast of Peru, made several prizes, and captured and burned the city of Paita. His squadron was now reduced to one ship, the *Centurion*, but with it he took the Spanish treasure galleon from Acapulco, and arrived in England in 1744, with treasure to the amount of $2,500,000, having circumnavigated the globe. His adventures and discoveries are described in the well-known *Anson's Voyage*, compiled from materials furnished by Anson. A few days after his return he was made rear-admiral of the blue, and not long after rear-admiral of the white. His victory over the French admiral Jonquière, near Cape Finisterre in 1747, raised him to the peerage, with the title of Baron of Soberton. Four years later he was made first lord of the admiralty. In 1758 he commanded the fleet before Brest, protected the British at St. Malo, Cherbourg, etc., and received the repulsed troops into his vessels.

Ansonia (an-so'ni-a), a city of Connecticut, on the Naugatuck River, 12 miles N. W. of New Haven. Has manufactures of brass and copper goods, heavy machinery, electrical goods, etc. Pop. 17,643.

Anspach (ăn'spä*h*), or Ansbach, a town in Bavaria, at the junction of the Holzbach with the Lower Rezat, 24 miles southwest of Nürnberg. Anspach gave its name to an ancient principality or margravate, ruled by members of the house of Hohenzollern. It was united with Bayreuth in 1769, acquired by Prussia in 1791-92, ceded to Bavaria by Prussia in 1805, occupied by France in 1806, and ceded to Bavaria in 1810. The industries of the modern town consist of manufactures of trimmings, buttons, straw-wares, etc. Pop. 17,555.

Ansted (an'sted), David Thomas, an English geologist, born in 1814, died in 1880. He was professor of geology at King's College, London, and assistant secretary to the Geological Society, whose quarterly journal he edited for many years. His writings on geology were standard authorities.

Anster (an'-ster), John, professor of civil law in the University of Dublin, born in County Cork in 1793; died in 1867. He published a volume of poems, and was a frequent contributor to *Blackwood's Magazine*, the *Dublin University Magazine*, the *North British Review*, etc., but is chiefly known by his fine translation of Goethe's *Faust*, 1835–64.

Anstey (ăn'stē), Christopher, an English poet, born 1724, died 1805. He was author of *The New Bath Guide*, a humorous and satirical production describing fashionable life at Bath in the form of a series of letters in different varieties of meter, which had a great reputation in its day.

Anstey, F. See *Guthrie, Thomas Anthony.*

Anstruther (an'stru*th*-ẽr; popularly an'stẽr), Easter and Wester, two small royal and parliamentary burghs of Scotland, in Fifeshire, forming, with the contiguous royal burgh of Collardyke or Nether Kilrenny, one fishing and seaport town. Pop. 1,663.

Ant, the common name of hymenopterous (or membranous-winged) insects of various genera, of the family Formicidæ, found in most temperate and tropical regions. They are small but powerful insects, and have long been noted for their remarkable intelligence and interesting habits. They live in communities regulated by definite laws, each member of the society bearing a well-defined and separate part in the work of the colony. Each community consists of males; of females much larger than the males; and of barren females, otherwise called neuters, workers, or nurses. The neuters are wingless, and the males and females only acquire wings for their 'nuptial flight,' after which the males perish, and the few females which escape the pursuit of their numerous enemies divest themselves of their wings, and either return to established nests or become the foundresses of new colonies. The neuters perform all the labors of the ant-hill or abode of the community; they excavate the galleries, procure food, and feed the larvæ or young ants, which are destitute of organs of motion. In fine weather they carefully convey them to the surface for

the benefit of the sun's heat, and as attentively carry them to a place of safety either when bad weather is threatened or the ant-hill is disturbed. In like manner they watch over the safety of the nymphs or pupæ about to acquire their perfect growth. Some communities possess a special type of neuters, known as 'soldiers,' from the duties that specially fall upon them, and from their powerful biting jaws. There is a very considerable variety in the materials, size, and form of ant-hills, or nests, according to the peculiar nature or instinct of the species. Most of American ants form nests in woods, fields, or gardens, their abodes

Antananarivo.

being generally in the form of small mounds rising above the surface of the ground and containing numerous galleries and apartments. Some excavate nests in old tree-trunks. Houses built by the common wood-ant (*Formica rufa*) are frequently as large as a small hay-cock. Some ants live on animal food, very quickly picking quite clean the skeleton of any dead animal they may light on. Others live on saccharine matter, being very fond of the sweet substance, called honey-dew, which exudes from the bodies of Aphides, or plant-lice. These they sometimes keep in their nests, and sometimes tend on the plants where they feed; sometimes they even superintend their breeding. By stroking the aphides with their antennæ they cause them to emit the sweet fluid, which the ants then greedily sip up. Various other insects are looked after by ants in a similar manner, or are found in their nests. It has been observed that some species, like the Sanguinary Ant (*Formīca sanguinĕa*), resort to violence to obtain working ants of other species for their own use, plundering the nests of suitable kinds of their larvæ and pupæ, which they carry off to their own nests to be carefully reared and kept as slaves. In temperate countries male and female ants survive, at most, till autumn, or to the commencement of cool weather, though a very large proportion of them cease to exist long previous to that time. The neuters pass the winter in a state of torpor, and of course require no food. The only time when they require food is during the season of activity, when they have a vast number of young to feed. Some ants of Southern Europe feed on grain, and store it up in their nests for use when required. Some species have stings as weapons, others only their powerful mandibles, or an acrid and pungent fluid (formic acid) which they can emit. The name white ant is given to the neuropterous insects otherwise called Termites. See *Termites*.

Antacid (ant-as'id), an alkali, or any remedy for acidity in the stomach. Dyspepsia and diarrhœa are the diseases in which antacids are chiefly employed. The principal antacids in use are magnesia, lime, and their carbonates, and the bicarbonates of potash and soda.

Antæus (an-tē'us), the giant son of Poseidon (Neptune) and Gē (the Earth), who was invincible so long as he was in contact with the earth. Heracles (Hercules) grasped him in his arms and stifled him suspended in the air.

Antakieh, Antakia. See *Antioch*.

Antalkali (ant-al'ka-li), a substance which neutralizes an alkali, and is used medicinally to counteract an alkaline tendency in the system. All true acids have this power.

Antananarivo (an-tan-an-a-rē′vō), the capital of Madagascar, situated in the central province of Imérina; of late years almost entirely rebuilt, its old timber houses having been replaced by buildings of sun-dried brick on European models. It contains two royal palaces, immense timber structures, one of which has been lately surrounded with a massive stone verandah with lofty corner towers. It has manufactures of metal work, cutlery, silk, etc., and exports sugar, soap, and oil. Pop. (1907) 69,000.

Antar (an′tar), an Arabian warrior and poet of the sixth century, author of one of the seven Moallakas hung up in the Kaaba at Mecca; hero of a romance analogous in Arabic literature to the Arthurian legend of the English. The romance of Antar, which has been called the *Iliad of the Desert*, is composed in rhythmic prose interspersed with fragments of verse, many of which are attributed to Antar himself, and has been generally ascribed to Asmai (b. 740 A.D.; d. about 830 A.D.), preceptor to Harun-al-Rashid.

Antarctic (ant-ärk′tik), relating to the southern pole or to the region near it. The *Antarctic Circle* is a circle parallel to the equator and distant from the south pole 23° 28′, marking the area within which the sun does not set when on the tropic of Capricorn. The Antarctic Circle has been arbitrarily fixed on as the limits of the Antarctic Ocean, it being the average limit of the pack-ice; but the name is often extended to embrace a much wider area. The lands within the Antarctic region have of late years become far better known than formerly, and appear to be largely an elevated region, of continental extent. The chief regions are Victoria Land, King Edward VII Land and Ross Island, with the West Antarctic peninsula. Most of the expeditions to the South Pole have been by way of the Ross Sea opening into the Pacific, about 1500 miles from New Zealand.

There is no animal life apart from that in the sea and along the shore. Among the birds the most notable are the penguins, which have almost human characteristics. There are several varieties of seal, whales and dolphins. See articles on *Amundsen, Scott, Shackleton and South Polar Exploration.*

Ant-eater, a name given to mammals of various genera that prey chiefly on ants, but usually confined to the genus *Myrmecophaga*, order Edentata. In this genus the head is remarkably elongated, the jaws destitute of teeth, and the mouth furnished with a long, extensile tongue covered with glutinous saliva, by the aid of which the animals secure their insect prey. The eyes are very small, the ears short and round, and the legs, especially the anterior, very robust, and furnished with long, compressed, acute nails, admirably adapted for breaking into the ant-hills. The most remarkable species is the *Myrmecophaga jubāta*, or ant-bear, a native of the warmer parts of South America. It is from 4 to 5 feet in length from the tip of the muzzle to the origin of the black bushy tail, which is about two feet long. The body is covered with long hair, particularly along the neck and back. It is a harmless and solitary animal, and spends most of its time in sleep. Some species are adapted for climbing trees in quest of the insects on which they feed, having prehensile tails. All are natives of South America. The name ant-eater is also given to the pangolins and to the aardvark of Africa. The echidna of Australia is sometimes called *porcupine ant-eater.*

Antecedent (an-tē-sē′dent), in grammar, the noun to which a relative or other pronoun refers; as, Solomon was the *prince who* built the temple, where the word *prince* is the antecedent of *who.*—In logic, that member of a hypothetical or conditional proposition which contains the condition, and which is introduced by *if* or some equivalent word or words; as, if the sun is fixed, the earth must move. Here the first and conditional proposition is the *antecedent*, the second the *consequent.*

Antediluvian (an-tē-di-lū′vi-an), before the flood or deluge of Noah's time; relating to what happened before the deluge. In geology the term has been applied to organisms, traces of which are found in a fossil state in formations preceding the Diluvial, particularly to extinct animals such as the palæotherium, the mastodon, etc.

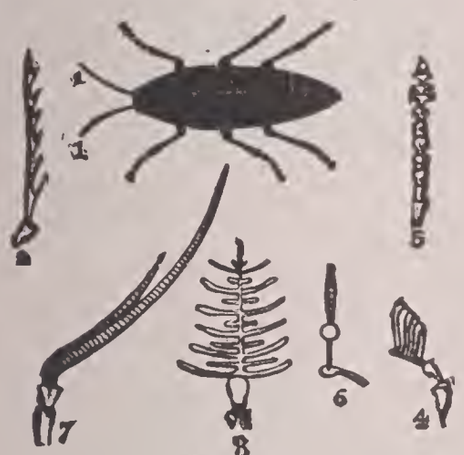
Antelope (an′te-lōp), the name given to the members of a large family of Ruminant Ungulata or Hoofed

Antelope—Koodoo (*Strepsiceros koodoo*).

Mammalia, closely resembling the Deer in general appearance, but essentially different in nature from the latter animals,

They are included with the sheep and oxen in the family of the Cavicornia or 'hollow-horned' ruminants. Their horns, unlike those of the deer, are not deciduous, but are permanent; are never branched, but are often twisted spirally, and may be borne by both sexes. They are very numerous and with great variety of species in Africa. Well-known species are the gazelle, the addax, the eland, the koodoo, the gnu, the springbok, the chamois of the Alps, the sasin or Indian antelope, and the pronghorn of America.

Antennæ (an-ten'ē), the name given to the movable jointed organs of touch and hearing attached to



Antennæ.

1, 1, Filiform Antennæ of Cucujo Firefly of Brazil (*Pyrophorus luminosus*). 2, Denticulate Antenna; 3, Bipinnate; 4, Lamellicorn; 5, Clavate; 6, Geniculate; 7, Antenna and Antennule of Crustacean.

the heads of insects, myriapods, etc., and commonly called horns or feelers. In radio telegraphy and telephony, the antenna or aerial (pl. antennae, aerials) is the wire or wires suspended in the air for receiving or transmitting wireless messages (see *Radio.*)

Antequera (an-tē-kā'ra), a city of Malaga province, Spain. It has manufactures of woolens, soap, paper, etc. Pop. 32,366.

Anteros (an'ter-ōs), in Greek mythology, the god of unrequited love; brother of Eros; he punished those who did not return the love of others.

Anthelion (an-thē'li-un), pl. ANTHELIA, a luminous ring, or rings, seen by an observer, especially in alpine and polar regions, around the shadow of his head projected on a cloud or fog-bank, or on grass covered with dew, 50 or 60 yards distant, and opposite the sun when rising or setting. It is due to the diffraction of light.

Anthelminthics, Anthelmintics (an-thel-min'tiks), a class of remedies used to destroy worms when lodged in the alimentary canal; classed as vermicides or vermifuges, according as the object is to kill the worms or to expel them by purgation.

Anthem (an'them), originally a hymn sung in alternate parts; in modern usage, a sacred tune or piece of music set to words taken from the Psalms or other parts of the Scriptures, first introduced into church service in Elizabeth's reign; a developed motet. The anthem may be for one, two, or any number of voices, but seldom exceeds five parts, and may or may not have an organ accompaniment written for it.

Anthemion (an-thē'mi-un), an ornament or ornamented series used in Greek Roman decoration, which is derived from floral forms, more

Anthemion.

especially the honeysuckle. It was much used for the ornamentation of friezes and interiors, for the decoration of fictile vases, the borders of dresses, etc.

Anthemis (an'the-mis), a genus of composite plants, comprising the camomile or chamomile.

Anthemius (an-thē'mi-us), a Greek mathematician and architect of Lydia; designed the Church of St. Sophia at Constantinople; wrote a learned treatise on burning-glasses, and established the use of the directrix.

Anther, the male organ of the flower; that part of the stamen which is filled with pollen.

a, Ovules.
b b, Anthers.
c, Stigma.

Anthesteria (an-thes-tē'ri-a), an annual Greek festival held in honor of all the gods, more particularly of Bacchus or Dionysus, and to celebrate the beginning of spring, and the season when the wine of the previous vintage was considered fit for use.

Anthocyanin (an-tho-sī'a-nin), the blue color of flowers, a pigment obtained from those petals of flowers which are blue by digesting them in spirits of wine.

Anthology (an-thol'o-gi; Gr. *anthos*, a flower, and *legein*, to gather), the name given to any collection of extracts from various authors

but especially to the Greek. The first who compiled a Greek anthology was Meleager, a Syrian, about 60 B.C. He entitled his collection, which contained selections from forty-six poets besides many pieces of his own, the *Garland;* a continuation of this work by Philip of Thessalonica in the age of Tiberius was the first entitled *Anthology.* Later collections are that of Constantine Cephalas, in the tenth century, who made much use of the earlier ones, and that of Maximus Planudes, in the fourteenth century, a monk of Constantinople, whose anthology is a tasteless series of extracts from the Anthology of Cephalas, with some additions. The treasures contained in both, increased with fragments of older poets, idyls of the bucolic poets, the hymns of Callimachus, epigrams from monuments and other works, have been published in modern times as the *Greek Anthology.*

An'thon, CHARLES, an American editor of classical school-books, and of works intended to facilitate the study of Greek and Latin literature; born at New York city in 1797, died in 1867. He was long a professor in Columbia College, New York.

An'thony, HENRY B., statesman, born at Coventry, Rhode Island, in 1815; died Sept. 2, 1884. He graduated at Brown University in 1833; edited the Providence *Journal* 1838–59; was governor of Rhode Island 1849–51, and U. S. Senator after 1859. In 1869 and again in 1871 he served as president *pro tempore* of the Senate.

An'thony, SUSAN B., born at Adams, Massachusetts, in 1820; died in 1906. She was an early and eloquent leader in antislavery and woman's rights movement, and also an advocate of total abstinence.

Anthony, ST., the founder of monastic institutions; he was born in Upper Egypt, about A.D. 251. Giving up all his property he retired to the desert, where he was followed by a number of disciples, who thus formed the first community of monks. He died at the age of 105.—*St. Anthony's Fire,* a name given to erysipelas.

Anthracene (an'thra-sēn), a hydrocarbon obtained from coal-tar being extracted from the last portion of the distillate by pressure. It forms small, colorless plates, which melt at about 415° F. to a colorless liquid, and distills at over 572°. It is insoluble in water, but easily so in hot alcohol, ether and benzol. Its chemical composition is $C_{14}H_{10}$, and it is of much commercial importance since it is the starting-point in the manufacture of artificial alizarin (*q. v.*).

Anthracite (an'thra-sīt), hard or stone coal, a non-bituminous coal of a shining luster, approaching to metallic, which burns without smoke, with a weak or no flame, and with intense heat. It consists of, on an average, 90 per cent. carbon, 3 hydrogen, and 5 ash, surpassing bituminous coal in hardness and heat-giving properties. It has some of the properties of coke or charcoal, and, like that substance, represents an extreme metamorphism of coal under the influence of heat of volcanic disturbance. It is found in large deposits in Pennsylvania and occurs rather sparingly elsewhere, but may prove to be abundant in China.

Anthrax (an'thraks), a fatal disease to which cattle, horses, sheep, and other animals are subject, always associated with the presence of an extremely minute micro-organism (*Bacillus anthracis*) in the blood. It frequently assumes an epizoötic form, and extends over large districts, affecting all classes of animals which are exposed to the exciting causes. Is is also called splenic fever, and is communicable to man, appearing as carbuncle, malignant pustule, or wool-sorter's disease.

Anthropolatry (an-thrō-pol'a-tri), the worship of man, a word always employed in reproach; applied by the Apollinarians, who denied Christ's perfect humanity, towards the orthodox Christians.

Anthropology (an-thrō-pol'o-ji), the science of man and mankind, including the study of man's place in nature, that is, of the measure of his agreement with and divergence from other animals; of his physical structure and psychological nature, together with the extent to which these act and react on each other; and of the various tribes of men, determining how these may have been produced or modified by external conditions, and consequently taking account also of the advance or retrogression of the human race. It puts under contribution all sciences which have man for their object, as archæology, comparative anatomy, physiology, psychology, climatology, etc. See *Ethnology.*

Anthropometry (an-thrō-pom'e-tri), the systematic examination of the height, weight, and other physical characteristics of the human body. It was shown in the British Association Report of 1883 that variations in stature, weight, and complexion, existing in different districts of the British Islands

ANTI-AIRCRAFT DEVICES

Observation post fitted with instruments for gauging the height and speed of enemy aircraft, a giant searchlight, a listening post and a "75" gun installed on the outskirts of Paris.

are chiefly due to difference of racial origin. The average height of the adult males of the principal races or nationalities of the world may be given as follows, but it is acknowledged that more numerous measurements might alter some of the figures considerably:—Polynesians 69.33 in., Patagonians 69 in., negroes of the Congo 69 in., Scotch 68.71 in., Iroquois Indians 68.28 in., Irish 67.90 in., Americans (whites) 67.67 in., English 67.66 in., Norwegians 67.66 in., Zulus 67.19 in., Welsh 66.66 in., Danes 66.65 in., Dutch 66.62 in., American negroes 66.62 in., Hungarians 66.58 in., Germans 66.54 in., Swiss 66.43 in., Belgians 66.38 in., French 66.23 in., Berbers 66.10 in., Arabs 66.08 in., Russians 66.04 in., Italians 66 in., Spaniards 65.66 in., Esquimaux 65.10 in., Papuans 64.78 in., Hindus 64.76 in., Chinese 64.17 in., Poles 63.87 in., Finns 63.60 in., Japanese 63.11 in., Peruvians 63 in., Malays 62.34 in., Lapps 59.02 in., Bushmen 52.78 in. Average 65.25 in.

Anthropomorphism (an-thrō-pō-mor'fism), the representation or conception of the Deity under a human form, or with human attributes and affections. *Anthropomorphism* is founded in the natural inaptitude of the human mind for conceiving spiritual things except through sensuous images.

Anthropophagi (an-thrō-pof'a-ji), the name given to those individuals or tribes by whom human flesh is eaten: man-eaters, cannibals. That there are nations who eat the flesh of enemies slain in battle, for example the Niam-Niam of Central Africa, and till recently the New Zealanders, is well known; but there are none who make human flesh their usual food. The Caribs are said to have been cannibals at the time of the Spanish conquest of America, and the word 'cannibal' is derived from their name.

Anti-aircraft Guns, an important branch of modern artillery. For defense against aircraft various types of guns were in use, in the Great war. Some were of the mobile type, mounted on motor vehicles; some were of the fixed type, mounted upon permanent emplacements; still others were of the field-piece type, which, while fired from a stationary position, might be moved from point to point upon a suitable carriage. The heaviest of the anti-aircraft motor-driven guns was the 10.5 centimeter (4¼-inch) quick firer, throwing a shell weighing nearly forty pounds with an initial velocity of 2333 feet per second. This gun was used extensively by the Germans in the war. A smaller 'Archibald' or 'Archie'—as the British troops termed these pieces—was the 3-inch gun throwing a 14.3 shell at an initial velocity of about 2170 feet per second. The Allied forces improvised traveling anti-aircraft offenses by mounting the latest types of Vickers, Hotchkiss and other machine guns in armored motor cars. Some of these guns maintained a hot fire ranging up to 750 shots per minute. The fixed anti-aircraft guns such as were stationed upon eminences and buildings and used by the British to combat the German air raiders were of the quick-firing type, the object being to hurl a steady stream of missiles upon the swiftly moving aeroplane. Machine guns were also used for this purpose, their range of approximately 2000 yards and rapidity of fire being of distinct value when hostile aircraft descended to an altitude which brought them within range of the weapon.

Antibes (ȧn-tēb), a fortified town and seaport of France, dep. Alpes-Maritimes, on the Mediterranean, 11 miles S. S. W. of Nice; founded about 340 B. C. Traces of a Roman circus and part of an aqueduct still remain; and urns, lamps, etc., have been found. Pop. 5730.

Antichlor (an'ti-klōr), the name given to any chemical substance, such as hyposulphite of sodium, employed to remove the small quantity of chlorine which obstinately adheres to the fibers of the cloth when goods are bleached by means of chlorine.

Antichrist (an'ti-krīst), a word occurring in the first and second epistles of St. John, and nowhere else in Scripture, in passages having an evident reference to a personage real or symbolical mentioned or alluded to in various other passages both of the Old and New Testaments. In every age the church has held through all its sects some definite expectation of a formidable adversary of truth and righteousness prefigured under this name.

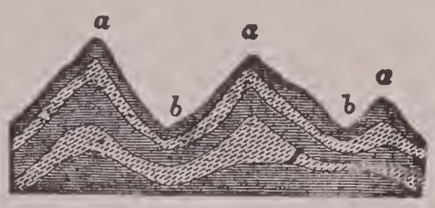
Anticlimax (an-ti-klī'maks), a sudden declension of a writer or speaker from lofty to mean thoughts or language, as in the well-known lines:

> Next comes Dalhousie, the great god of war;
> Lieutenant-colonel to the Earl oi Mar.

Anticlinal (an-ti-klī'nal), LINE OR AXIS, in geology, the ridge of a wave-like curve made by a series of superimposed strata, the strata dipping from it on either side as from the ridge of a house; a *synclinal line* runs along the trough of such a wave. Anticlines may be small curves in a hand specimen or large mountains.

Anticosti (an-ti-kos'ti), an island of Canada, in the mouth of

the St. Lawrence, 125 miles long by 30 miles broad. The interior is mountainous and wooded, but there is much good land, and it is well adapted for agriculture. The fisheries are valuable. The population is scanty, however.



aaa, Anticlinal Line. *bb*, Synclinal Line.

Anticyclone (an-ti-sī'klōn), a phenomenon presenting some features opposite to those of a cyclone. It consists of a region of high barometric pressure, the pressure being greatest in the center with winds flowing outwards from the center, and not inwards as in the cyclone, accompanied with great cold in winter and with great heat in summer.

Anticyra (an-tis'i-ra), the name of two towns of Greece, the one in Thessaly, the other in Phocis, famous for hellebore, which in ancient times was regarded as a specific against insanity and melancholy. Hence various jocular allusions in ancent writings.

Antidote (an'ti-dōt), a medicine to counteract the effects of a poison.

Antietam (an-tē'tam), a small stream which flows into the Potomac River near Sharpsburg, Maryland, Here was fought the Battle of Antietam on Sept. 17, 1862, between the Federal and Confederate armies, led by McClellan and Lee. It was one of the bloodiest battles of the Civil war, the Federals losing over 12,000 men, the Confederates, 11,000. On the battleground are many monuments. The New York State monument was dedicated Sept. 17, 1920.

Antifebrin (an-ti-fe'brin), or ACETANILID, a febrifuge and antineuralgic derived from aniline, to which it is closely allied. It was introduced in 1886, and its cheapness, rapidity of action, and reliability brought it quickly into use. It is a white powder, with burning taste; soluble in alcohol.

Antigo (an'ti-gō), a city, county seat of Langlade county, Wisconsin, 207 miles N. W. of Milwaukee, in a natural grain and grass country. Bee keeping is an important industry in the county. The city has foundry and machine shops, saw mills, furniture factories, etc. It is a division point on the Chicago & N. W. R. R. Pop. (1920) 8451.

Antigone (an-tig'o-nē), in Greek mythology, the daughter of Œdipus and Jocasta, celebrated for her devotion to her father and to her brother Polynices, for burying whom against the decree of King Creon she suffered death. She is heroine of Sophocle's *Œdipus at Colonus* and his *Antigone*.

Antigonus (an-tig'o-nus), one of the generals of Alexander the Great, born about 382 B.C. After the death of Alexander, Antigonus obtained Greater Phrygia, Lycia, and Pamphylia as his dominion. Ptolemy, Cassander, and Lysimachus, alarmed by his ambition, united themselves against him; and a long series of contests ensued in Syria, Phœnicia, Asia Minor, and Greece, ending in 301 B.C. with the battle of Ipsus in Phrygia, in which Antigonus was defeated and slain. —ANTIGONUS GON'ATAS, son of Demetrius Poliorcetēs, and grandson of the above, succeeded his father in the Kingdom of Macedon and all his other European dominions; died after a reign of forty-four years B.C 239.

Antigua (an-tē'ga), one of the British West Indies, the most important of the Leeward group; 28 miles long, 20 broad; area, 108 square miles. Discovered by Columbus, 1493. Its shores are high and rocky; the surface is varied and fertile. The capital, St. John, the residence of the governor of the Leeward Islands, stands on the shore of a well-sheltered harbor in the northwest part of the island. The staple articles of export are sugar, molasses, rum. Pop. (including Barbuda), 34,971, of which 28,000 are negroes.

Antilles (an-til'ēz, an-tēl), another name for the West Indian Islands.

Antimachus (an-tim'a-kus), a Greek poet who lived about 400 B.C., and wrote an epic called the *Thebais*, and a long elegy called *Lydē*, inspired by a mistress of that name; only fragments of his writings remain.

Anti-Masonic Party, an American organization which opposed the alleged influence of freemasonry in civil affairs. It sprang up in western New York, following the kidnapping of William Morgan in 1826, who, it was said, had threatened to disclose the secrets of the order. It held a national convention in 1831, but was absorbed by the Whigs. Anti-Masonic agitation prevailed for some time in local political affairs. Its revival under the name of the American Party was attempted in 1875, but the project gained only a small following.

Antimony (an'ti-mo-ni; chemical sym. Sb, from L. *stibium;*

sp. gr. 6.8, atomic wt. 120), a brittle metal of a bluish-white or silver-white color and a crystalline or laminated structure. It melts at 842° F., and burns with a bluish-white flame. The mineral called stibnite or antimony-glance, is a trisulphide (Sb_2S_3), and is the chief ore from which the metal is obtained. It is found in many places, including France, Spain, Hungary, Italy, Canada, Australia, and Borneo. The metal, or, as it was formerly called, the *regulus of antimony*, does not rust or tarnish when exposed to the air. When alloyed with other metals it hardens them, and is therefore used in the manufacture of alloys, such as Britannia-metal, type-metal, and pewter. In bells it renders the sound more clear; it renders tin more white and sonorous as well as harder, and gives to printing types more firmness and smoothness. The salts of antimony are very poisonous. Tartar emetic is the tartrate of antimony and potassium and has long been justly regarded as a most valuable remedy in many diseases.—*Yellow antimony* is a preparation of antimony of a deep yellow color, used in enamel and porcelain painting. It is of various tints, and the brilliancy of the brighter hues is not affected by foul air.

St. John, Antigua, from the foreground of the Scotch Church.

Antinomianism (an-ti-nō′mi-an-izm, 'opposition to the law'), the name given by Luther to the inference drawn by John Agricola from the doctrine of justification by faith, that the moral law is not binding on Christians as a rule of life. The term antinomian has since been applied to all doctrines and practices which seem to contemn or discountenance strict moral obligations. The Lutherans and Calvinists have both been charged with antinomianism, the former on account of their doctrine of justification by faith, the latter both on this ground and that of the doctrine of predestination. The charge is, of course, vigorously repelled by both.

Antinomy (an-ti-nō′my), the opposition of one law or rule to another law or rule; in the Kantian philosophy, that natural contradiction which results from the law of reason, when, passing the limits of experience, we seek to conceive the complex of external phenomena, or nature, as a world or cosmos.

Antinous (an-tin′o-us), a young Bithynian whom the extravagant love of Hadrian has immortalized. He drowned himself in the Nile in 122 A.D., to save Hadrian from an impending catastrophe, predicted by an oracle unless averted by the self-sacrifice of the emperor's most beloved friend. Hadrian set no bounds to his grief for his loss. He gave his name to a newly-discovered star, erected temples in his honor, called a city after him, and caused him to be adored as a god throughout the empire. Statues, busts, etc., of him are numerous.

Antioch (an′ti-ok; anciently, *Antiochia*), a famous city of ancient times, the capital of the Greek kings of Syria, on the left bank of the Orontes, about 21 miles from the sea, in a beautiful and fertile plain; founded by Seleucus Nicator in 300 B.C., and named after his father Antiochus. In Roman times it was the seat of the Syrian governors, and the center of a widely extended commerce. It was called the 'Queen of the East' and 'The Beautiful.' Antioch is frequently mentioned in the New Testament, and it was here that the disciples of our Saviour were first

called Christians (Acts, xi, 26). In the first half of the seventh century it was taken by the Saracens, and in 1098 by the Crusaders. They established the principality of Antioch, of which the first ruler was Bohemond, and which lasted till 1268, when it was taken by the Mameluke Sultan of Egypt. In 1516 it passed into the hands of the Turks. The modern Antioch, or *Antakieh*, occupies but a small portion of the site of the ancient Antioch. Pop. about 28,000. Its ancient population was estimated at 400,000. There was another Antioch, in Pisidia, at which Paul preached on his first missionary journey.

Antiochus (an-tī'o-kus), a name of several Græco-Syrian kings of the dynasty of the Seleucidæ. ANTIOCHUS I, called Sōtēr ('saviour'), was son of Seleucus, general of Alexander the Great, and founder of the dynasty. He was born about B.C. 324, and succeeded his father in B.C. 280. During the greater part of his reign he was engaged in a protracted struggle with the Gauls, who had crossed from Europe, and by whom he was killed in battle B.C. 261.—ANTIOCHUS II, surnamed Theos (god), succeeded his father, lost several provinces by revolt, and was murdered in B.C. 246 by Laodicē, his wife, whom he had put away to marry Berenīcē, daughter of Ptolemy.—ANTIOCHUS III, surnamed the *Great*, grandson of the preceding, was born B.C. 242, succeeded in B.C. 223. The early part of his reign embraced a series of wars against revolted provinces and neighboring kingdoms, his expeditions extending to India, over Asia Minor, and later into Europe, where he took possession of the Thracian Chersonese. Here he encountered the Romans, who had conquered Philip V of Macedon, and were prepared to resist his further progress. Antiochus gained an important adviser in Hannibal, who had fled for refuge to his court; but he lost the opportunity of an invasion of Italy while the Romans were engaged in war with the Gauls, of which the Carthaginian urged him to avail himself. The Romans defeated him by sea and land, and he was finally overthrown by Scipio at Mount Sipylus in Asia Minor, B.C. 190, and very severe terms were imposed upon him. He was killed while plundering a temple in Elymais to procure money to pay the Romans.—ANTIOCHUS IV, called *Epiphanes*, youngest son of the above, is chiefly remarkable for his attempt to extirpate the Jewish religion, and to establish in its place the polytheism of the Greeks.

Medal of Antiochus Epiphanes.

Antioquia (ån-tē-ō-kē'å), a town of South America, in Colombia, on the river Cauca; founded in 1542. Pop. 9000. It gives name to a department of the republic; area, 22,870 sq. miles; pop. about 500,000. It has rich ores of the precious metals and dense forests. Capital, Medellin.

Antiparos (an-tip'a-ros; ancient Oliăros), one of the Cyclades Islands in the Grecian Archipelago, containing a famous stalactitic grotto or cave. It lies southwest of Paros, from which it is separated by a narrow strait, and has an area of 10 squares miles, and about 700 inhabitants.

Antipater (an-tip'a-tėr), a general and friend of Philip of Macedon, father of Alexander the Great. On the death of Alexander, in 323 B.C., the regency of Macedonia was assigned to Antipater, who succeeded in establishing the Macedonian rule in Greece on a firm footing. He died in B.C. 319 at an advanced age.

Antiphlogistic (an-ti-flō-jis-tik), a term applied to medicines or methods of treatment that are intended to counteract inflammation.

Antiphlogistine (flō-jis'tin), the trade name for cataplasma kaolin, a clay-like substance, grey in color, containing boric acid, methyl-salicylate, thymol, glycerine and wintergreen, used for the reduction of inflammation in cases of rheumatism, pneumonia, etc.

Antiphon (an'ti-fon), a Greek orator, born near Athens; founder of political oratory in Greece. His orations are the oldest extant, and he is said to have been the first who wrote speeches for hire. He was put to death for taking part in the revolution of B.C. 411, which established the oligarchic government of the Four Hundred.

Antiphon, Antiphony (an-tif'o-ni; 'alternate song'), in the Christian church a verse first sung by a single voice, and then repeated by the whole choir; or any piece to be sung by alternate voices.

Antipodes (an-tip'o-dēz), the name given relatively to people or places on opposite sides of the earth, so situated that a line drawn from one to the other passes through the center of the earth and forms a true diameter. The longitudes of two such places differ by 180°. The difference in their time is about twelve hours, and their seasons are reversed.

Antipodes Islands, a group of small uninhabited islands in the South Pacific Ocean, about 460 miles S. E. by E. of New Zealand; so called from being nearly antipodal to Greenwich. Antipodes Island rises to 1,300 feet, and is largely covered with coarse grass; huts have recently been fitted up to shelter castaways.

Antipope (an'ti-pōp), the name applied to those who at different periods have produced a schism in the Roman Catholic Church by opposing the authority of the pope, under the pretense that they were themselves popes. They have in nearly all cases been the creatures of some political power at odds with the reigning pontiff over the relations between temporal and spiritual affairs. They were most frequent in the tenth, eleventh and twelfth centuries, first on account of the factional strifes among the Roman nobility, and then of the great struggle about investitures between the popes and the German emperors. The longest crisis of this kind was that known as the Great Schism (1378–1417). Felix V (abd. 1449) was the last antipope.

Antipyrin (an-ti-pī'rin), a useful substitute for quinine, obtained from coal-tar by a complex chemical process. It is a white, tasteless powder, which reduces the temperature in fevers without the discomfort of profuse perspiration, which gives it great value as a febrifuge.

Antiquaries (an'ti-qua-rēs), those devoted to the study of ancient times through their relics, as old places of sepulture, remains of ancient habitations, early monuments, implements or weapons, statues, coins, medals, paintings, inscriptions, books, and manuscripts, with the view of arriving at a knowledge of the relations, modes of living, habits, and general condition of the people who created or employed them. Societies or associations of antiquaries have been formed in all countries of European and American civilization.

Anti-Rent War, a struggle which resulted from the dissatisfaction of tenants under the patroon system in some of the counties of New York state. The feud lasted for several years from 1839, when Stephen Van Rensselaer, one of the largest landowners died, to 1846, when the legislature abolished all feudal tenures.

Antirrhinum (an-ti-rī'num). See *Snapdragon.*

Anti-Saloon League, an American society for the suppression of the liquor traffic, first founded in Ohio as a state body in 1893. It is now a national organization, with branch leagues throughout the country. The executive offices are at Westerville, O., and the Legislative Committee at Washington, D. C. The league has been devoted chiefly to influencing legislation in favor of prohibition, and a long series of successes must be credited to the work of this society, including the Federal prohibition amendment. See *Prohibition.*

Antiseptic (an-ti-sep'tik; Gr. *anti,* against, and *sēpein,* to rot), an agent by which the putrefaction of vegetable or animal matters is prevented or arrested or which prevents the growth of septic bacteria. There are a great number of substances having this preservative property, among which are salt, alcohol, vegetable charcoal, creosote, corrosive sublimate, tannic acid, sulphurous acid, sulphuric ether, chloroform, arsenic, wood-spirit, aloes, camphor, benzine, aniline, etc. The packing of fish in ice, and the curing of herring and other fish with salt, are familiar antiseptic processes. The different antiseptics act in different ways. The term is applied in a specific manner to that mode of treatment in surgery by which bacteria in the air are excluded from wounds on whose presence suppuration is known to depend. Also applies to the antiseptic cleansing of injuries or to skin surfaces before operation to remove bacteria presumed to be present.

The discovery of the ideal antiseptic was announced on August 5, 1915, by Dr. Alexis Carrel, of the Rockefeller Institute, and Dr. Henry D. Dakin, of the Lister Institute. It is made by adding carbonate of lime and boric acid to hypochlorite of lime. Remarkable results have been attained by its use, and if applied in time, it is asserted, infection in wounds is impossible. Independent research on the part of Prof. Lorrelin Smith, produced similar results. See *Lister.*

Anti-Slavery, a party in the United States before the civil war, in opposition to the slavery system. See *Abolitionists.*

Antispasmodic (an-ti-spaz-mod'ik), a medicine proper for the cure or prevention of spasms and convulsions. Such belongs, to some extent, to the class of ether, chloroform, amyl, nitrite, etc.; others are narcotics, as morphine, hyoscine, etc.

Antisthenes (an-tis'thē-nēz), a Greek philosopher and founder of the school of Cynics, born at Athens before B.C. 400. He was a disciple of Socrates.

Antistrophe (an-tis'trō-fē). See *Strophe.*

Antitaurus (an-ti-taw'rus). See *Taurus.*

Antithesis (an-tith'e-sis; opposition), figure of speech consisting in a contrast or opposition of words or sentiments; as, 'When our vices *leave us*, we flatter ourselves we *leave them*'; 'The prodigal *robs his heir*, the miser *robs himself.*'

Antitoxin (an-ti-toks'in), specifically the antibody to a toxin of bacterial or related origin which is produced as the result of immunization with the corresponding toxin. Examples are the diphtheria antitoxin and the tetanus antitoxin. Streptococcus antitoxin is an antitoxin obtained by repeated inoculations of horses with streptococcus cultures; employed by hypodermic injection in the treatment of erysipelas, puerperal fever, septicemia and other conditions in which there is infection by streptococci. The value of antitoxin in diphtheria is now so fully established that its administration is a routine procedure in cases of this disease, and there are various other uses to which it is successfully applied. Its use in medical practice is of modern date.

Anti-trade, a name given to any of the upper tropical winds which move northward or southward in the same manner as the trade-winds which blow beneath them in the opposite direction. These great aerial currents descend to the surface after they have passed the limits of the trade-winds, and form the southwest or west-southwest winds of the north temperate, and the northwest or west-northwest winds of the south temperate zones.

Antitrinitarians (an-ti-trin-i-tā'ri-anz), all who do not accept the doctrine of the divine Trinity, or the existence of three persons in the Godhead; especially applied to those who oppose such a doctrine on philosophical grounds, as contrasted with Unitarians, who reject the doctrine as not warranted by Scripture.

Antitype (an'ti-tīp), that which is correlative to a type; by theological writers the term is employed to denote the reality of which a *type* is the prophetic symbol.

Antium (an'ti-um), in ancient Italy, one of the most ancient and powerful cities of Latium, the chief city of the Volsci, and often at war with the Romans, by whom it was finally taken in 338 B.C. It was 38 miles distant from Rome, a flourishing seaport, and became a favorite residence of the wealthy Romans. It was destroyed by the Saracens; but vestiges of it remain at Porto d'Anzio, near which many valuable works of art have been found.

Antivari (ăn-tē'vä-rē), a seaport town on the eastern shore of the Adriatic, ceded to Montenegro by the Treaty of Berlin (1878). Pop. about 2500.

Antlers (ant'lerz), the horns of the deer tribe, or the snags or branches of the horns. See *Deer.*

Ant-lion, the larva of a Neuropterous insect (*Myrmeleon formicārius*), which in its perfect state greatly resembles a dragon-fly; curious on account of its ingenious method of catching the insects—chiefly ants—on which it feeds. It digs a funnel-shaped hole in the driest and finest sand it can find, and when the pit is deep enough, and the sides are quite smooth and sloping, it buries itself at the bottom with only its formidable mandibles projecting, and waits till some luckless insect stumbles over the edge, when it is immediately seized, its juices sucked, and the dead body jerked from the hole.

Perfect Insect (*Myrmeleon formicarius*) and Larva (ant-lion).

Antofagasta (ăn-to-fä-gäs'tä), a Chilean seaport, capital of the province of the same name, taken from Bolivia in 1882. The port is connected by rail with the silver mines of Caracoles and Huanchaca. Pop. 66,584. The province is rich in silver, lead, iron, saltpetre, borax, manganese and guano. Area 46,408; pop. 220,050.

Antoinette (ăn-twä-net), MARIE (Marie Antoinette Jo-

sèphe Jeanne de Lorraine), Archduchess of Austria and Queen of France, the youngest daughter of the Emperor Francis I and of Maria Theresa, was born at Vienna, 2d November, 1755; executed at Paris, 16th Oct., 1793. She was married at the age of fifteen to the dauphin, afterwards Louis XVI, but her manners were ill suited to the French court, and she made many enemies among the highest families by her contempt for its ceremonies, which excited her ridicule. The freedom of her manners, indeed, even after she became queen, was a cause of scandal. The extraordinary affair of the diamond necklace, in which the Cardinal Louis de Rohan, the great quack Cagliostro, and a certain Countess de Lamotte were the chief actors, tarnished her name and added force to the calumnies against her. Though it was proved in the examination which she demanded that she had never ordered the necklace, her enemies succeeded in casting a stigma on her, and the credulous people laid every public disaster to her charge. There is no doubt she had great influence over the king, and that she constantly opposed all measures of reform. The enthusiastic reception given her at the guards' ball at Versailles on 1st October, 1789, raised the general indignation to the highest pitch, and was followed in a few days by the insurrection of women, and the attack on Versailles. When virtually prisoners in the Tuileries it was she who advised the flight of the royal family in June, 1791, which ended in their capture and return. On 10th August, 1792, she heard her husband's deposition pronounced by the Legislative Assembly, and accompanied him to the prison in the Temple, where she displayed the magnanimity of a heroine and the patient endurance of a martyr. In January, 1793, she parted with her husband, who had been condemned by the Convention; in August she was removed to the Conciergerie; and in October she was charged before the revolutionary tribunal with having dissipated the finances, exhausted the treasury, corresponded with the foreign enemies of France, and favored the domestic foes of the country. She defended herself with firmness, decision, and indignation; and heard the sentence of death pronounced with perfect calmness—a calmness which did not forsake her when the sentence was carried out the following morning. Her son, eight years of age, died shortly afterwards, and her daughter was suffered to quit France, and afterwards married her cousin, the Duke of Angoulême.

Antommarchi (an-tom-märʹkē), Carlo Francesco, an Italian physician, born in Corsica in 1780, died in Cuba in 1838. He was professor of anatomy at Florence when he offered himself as physician of Napoleon at St. Helena. Napoleon at first received him with reserve, but soon admitted him to his confidence, and testified his satisfaction with him by leaving him a legacy of 100,000 francs. On his return to Europe he published the *Derniers Moments de Napoléon* (two vols., 8vo, 1823).

Antonelli (än-to-nelʹlē), Giacomo, cardinal, born 1806, died 1876. He was educated at the Grand Seminary of Rome, where he attracted the attention of Pope Gregory XVI, who appointed him to several important offices. On the accession of Pius IX, in 1846, Antonelli was raised to the dignity of cardinal deacon; two years later he became president and minister of foreign affairs, and in 1850 was appointed secretary of state. During the sitting of the Œcumenical Council (1869–70) he was a prominent champion of the papal interest. He strongly opposed the assumption of the united Italian crown by Victor Emanuel.

Antonello (an-to-nelʹlō), of Messina, an Italian painter who died about the close of the 15th century, and is said to have introduced oil-painting into Italy (at Venice), having been instructed in it by John van Eyck.

Antoninus (an-to-nīʹnus), Itinerary of. See *Itinerary*.

Antoninus, Marcus Aurelius. See *Aurelius*.

Antoninus, Wall of, a barrier erected by the Romans in Britain across the isthmus between the Forth and the Clyde, in the reign of Antoninus Pius. Its western extremity was at or near Dunglass Castle, its eastern at Carriden, and the whole length of it exceeded 36 miles. It was constructed A.D. 140 by Lollius Urbicus, the imperial legate, and consisted of a ditch 40 feet wide and 20 feet deep, and a rampart of stone and earth on the south side 24 feet thick and 20 feet in height. It was strengthened at each end and along its course by a series of forts

Coin of Antoninus Pius.

and watch-towers. It may still be traced at various points, and is commonly known as *Graham's Dyke*.

Antoni'nus Pius, Titus Aurelius Fulvus, Roman emperor, was born at Lavinium, near Rome, A.D. 86, died A.D. 161. In A.D. 120 he became consul, and he was one of the four persons of consular rank among whom Hadrian divided the supreme administration of Italy. He then went as proconsul to Asia, and after his return to Rome became more and more the object of Hadrian's confidence. In A.D. 138 he was selected by that emperor as his successor, and the same year he ascended the throne. The persecutions of the Christians he speedily abolished. He carried on but a few wars. In Britain he extended the Roman dominion, and by raising a new wall (see preceding art.) put a stop to the invasions of the Picts and Scots. The senate gave him the surname Pius, that is, dutiful or showing filial affection, because to keep alive the memory of Hadrian he had built a temple in his honor. He was succeeded by Marcus Aurelius, his adopted son.

Antonius (an-tō'ni-us), Marcus (Mark Antony), Roman triumvir, born 83 B.C., was connected with the family of Cæsar by his mother, Debauchery and prodigality marked his youth. To escape his creditors he went to Greece in 58, and from thence followed the consul Gabinius on a campaign in Syria as commander of the cavalry. He served in Gaul under Cæsar in 52 and 51. In 50 he returned to Rome to support the interests of Cæsar against the aristocratical party headed by Pompey, and was appointed tribune. When war broke out between Cæsar and Pompey, Antony led reinforcements to Cæsar in Greece, and in the battle of Pharsalia he commanded the left wing. He afterwards returned to Rome with the appointment of master of the horse and governor of Italy (47). In B.C. 44 he became Cæsar's colleague in the consulship. Soon after Cæsar was assassinated, and Antony would have shared the same fate had not Brutus stood up in his behalf. Antony, by the reading of Cæsar's will, and by the oration which he delivered over his body, excited the people to anger and revenge, and the murderers were obliged to flee. After several quarrels and reconciliations with Octavianus, Cæsar's heir (see *Augustus*), Antony departed to Cisalpine Gaul, which province had been conferred upon him against the will of the senate. But Cicero thundered against him in his famous **Philippics**; the senate declared him a public enemy, and entrusted the conduct of the war against him to Octavianus and the consuls Hirtius and Pansa. After a campaign of varied fortunes Antony fled with his troops over the Alps, Here he was joined by Lepidus, who commanded in Gaul, and through whose mediation Antony and Octavianus were again reconciled. It was agreed that the Roman world should be divided among the three conspirators, who were called triumvirs. Antony was to take Gaul; Lepidus, Spain; and Octavianus, Africa and Sicily. They decided upon the proscription of their mutual enemies, each giving up his friends to the others, the most celebrated of the victims demanded by Antony being Cicero the orator. Antony and Octavianus departed in 42 for Macedonia, where the united forces of their enemies, Brutus and Cassius, formed a powerful army, which was, however, speedily defeated at Philippi. Antony next visited Athens, and thence proceeded to Asia. In Cilicia he ordered Cleopatra, Queen of Egypt, to apologize for her insolent behavior to the triumviri. She appeared in person, and her charms fettered him forever. He followed her to Alexandria, where he bestowed not even a thought upon the affairs of the world, till he was aroused by a report that hostilities had commenced in Italy between his own relatives and Octavianus. A short war followed, which was decided in favor of Octavianus before the arrival of Antony in Italy. A reconciliation was effected, which was sealed by the marriage of Antony with Octavia, the sister of Octavianus. A new division of the Roman dominions was now made (in 40), by which Antony obtained the East, Octavianus the West. After his return to Asia Antony gave himself up entirely to Cleopatra, assuming the style of an eastern despot, thus alienating many of his adherents and embittering public opinion against him at Rome. At length war was declared at Rome against the Queen of Egypt, and Antony was deprived of his consulship and government. Each party assembled its forces, and Antony lost, in the naval battle at Actium (B.C. 31), the dominion of the world. He followed Cleopatra to Alexandria, and on the arrival of Octavianus his fleet and cavalry deserted, and his infantry was defeated. Deceived by a false report which Cleopatra had disseminated of her death, he fell upon his own sword (B.C. 30).

Antonomasia (an-tō-nō-mā'zi-a), in rhetoric, the use of the name of some office, dignity, profession, science, or trade instead of the true **name**

of the person, as when *his majesty* is used for a king, *his lordship* for a nobleman; or when, instead of Aristotle, we say, *the philosopher;* or, conversely, the use of a proper noun instead of a common noun; as, a *Solomon* for a wise man.

Antony, Mark. See *Antonius, Marcus.*

Antony, St. See *Anthony.*

Antrim (an'trim), a county of Ireland, province of Ulster, in the northeast of the island; area, 1,191 sq. miles, of which about a third is arable. The eastern and northern districts are comparatively mountainous, with tracts of heath and bog, but no part rises to a great height. The principal rivers are the Lagan and the Bann, which separate Antrim from Down and Londonderry, respectively. The general soil of the plains and valleys is strong loam. Flax, oats, and potatoes are the principal agricultural produce. Cattle, sheep, swine, and goats are extensively reared. There are salt-mines and beds of iron-ore, which is worked and exported. A range of basaltic strata stretches along the northern coast, of which the celebrated Giant's Causeway is the most remarkable portion. Linen and cotton-spinning and weaving are the staple manufactures. The principal towns are Belfast, Ballymena, and Larne. Many of the inhabitants are Presbyterians, being the descendants of Scottish immigrants of the seventeenth century. The county sends four members to Parliament. Pop. 461,250. The town of Antrim, at the north end of Lough Neagh, is a small place with a pop. of 2,020.

Ant-thrush, a name given to certain passerine or perching birds having resemblance to the thrushes and supposed to feed largely on ants. They all have longish legs and a short tail. The ant-thrushes of the Old World belong to the genus *Pitta.* They inhabit southern and southeastern Asia and the Eastern Archipelago, and are birds of brilliant plumage. The New World ant-thrushes belong to South America, and live among close foliage and bushes. Some of them are called ant-shrikes and ant-wrens. They belong to several genera.

Antwerp (ant'wêrp; Dutch and Ger. *Antwerpen,* French, *Anvers*), the chief port of Belgium, and the capital of a province of the same name, on the Scheldt, about 50 miles from the open sea. It is strongly fortified, being completely surrounded on the land side by a semicircular inner line of fortifications, the defenses being completed by an outer line of forts and outworks. The cathedral, with a spire 400 feet high,

Antwerp Cathedral, from the Egg Market.

one of the largest and most beautiful specimens of Gothic architecture in Belgium, contains Rubens's celebrated masterpieces, the *Descent from the Cross,* the *Elevation of the Cross,* and *The Assumption.* The other churches of note are St. James's, St. Andrew's, and St. Paul's, all enriched with paintings by Rubens, Van Dyck, and other masters. Among the other edifices of note are the exchange, the town-hall, the palace, theater, academy of the fine arts, picture and sculpture galleries, etc. The harbor accommodation is extensive and excellent, new docks and quays having been built in recent years. The shipping trade has greatly advanced, and is now very large, the goods being largely in transit. There are numerous and varied industries. Antwerp is mentioned as early as the 7th century, and in the 11th and 12th centuries it had attained a high degree of prosperity. In the early 16th century it is said to have had a pop. of 200,000. The wars between the Netherlands and Spain greatly injured its commerce, which was almost ruined by the closing of the navigation of the

Scheldt in accordance with the peace of Westphalia (1648). It was only in the 19th century that its prosperity revived. Population (1915), 312,884. In the invasion of Belgium by the Germans in 1914 Antwerp, though strongly fortified and defended by a large Belgian army, was unable to withstand the powerful German guns. Siege was laid to it on September 28, and it fell October 10. The city was re-entered by King Albert and Queen Elizabeth November 20, 1918, following the armistice signed by Germany November 11. See *European War.*

Anubis (a-nū'bis; written Inpw in hieroglyphs), one of the deities of the ancient Egyptians, the son of Osiris by Isis. The Egyptian sculptures represent him with the head or under the form of a jackal, with long pointed ears. His office was to conduct the souls of the dead from this world to the next, and in the lower world he weighed the souls of the deceased previous to their admission to the presence of Osiris.

Anubis.

Anupshahr (a-nöp'shär), a town of Hindustan, N. W. Provinces, on the Ganges, 75 miles S. E. of Delhi, a resort of Hindu pilgrims who bathe in the Ganges. Pop. about 10,000.

Anus (ā'nus), the opening at the lower or posterior extremity of the alimentary canal through which the excrement or waste products of digestion are expelled.

Anvil (an'vil), an instrument on which pieces of metal are laid for the purpose of being hammered. The common smith's anvil is generally made of seven pieces, namely, the core or body; the four corners for the purpose of enlarging its base; the projecting end, which contains a square hole for the reception of a set or chisel to cut off pieces of iron; and the beak or conical end, used for turning pieces of iron into a circular form, etc. These pieces are each separately welded to the core and hammered so as to form a regular surface with the whole. When the anvil has received its due form, it is faced with steel, and is then tempered in cold water. The smith's anvil is generally placed loose upon a wooden block. The anvil for heavy operations, such as the forging of ordnance and shafting, consists of a huge iron block deeply embedded, and resting on piles of masonry.

Anura, or ANOURA (a-nū'ra; Gr. *a,* negative, *oura,* a tail), an order of Batrachians which lose the tail when they reach maturity, such as the frogs and toads.

Anuradhapura. See *Anarajapura.*

Anville, D', JEAN BAPTISTE BOURGUIGNON, (jäṇ bàp-tēst bör-gē-nyōṇ däṇ-vēl), a celebrated French geographer, born in 1697, died in 1782.

Anzacs, a name given to the troops from Australia and New Zealand who fought in the European war (*q. v.*). It is derived from the initials of the two British dominions.

Anzin (äṇ-zaṇ), a town of France, department of Nord, about 1 mile northwest from Valenciennes, in the center of an extensive coal-field, with blast furnaces, forges, rolling-mills, foundries, etc. Pop. 14,500.

Aonia (a-on'i-ā), in ancient geography a name for part of Bœotia in Greece, containing Mount Helicon and the fountain Aganippe, both haunts of the muses.

Aorist (ā'ō-rist), the name given to one of the tenses of the verb in some languages (as the Greek), which expresses indefinite past time.

Aorta (a-or'ta), in anatomy, the great artery or trunk of the arterial system, proceeding from the left ventricle of the heart, and giving origin to all the arteries except the pulmonary. It first rises towards the top of the breast-bone, when it is called the *ascending aorta;* then makes a great curve, called the transverse or *great arch of the aorta,* whence it gives off branches to the head and upper extremities; thence proceeding towards the lower extremities, under the name of the *descending aorta,* it gives off branches to the trunk; and finally divides into the two iliacs, which supply the pelvis and lower extremities.

Aosta (à-os'tà; anc. Augusta Prætoria), a town of North Italy, 50 miles N. N. W. of Turin.

Aoudad (a'ou-dad), the *Ammotragus tragelaphus,* a quadruped allied to the sheep, most closely to the moufflon, from which, however, it may be easily distinguished by the heavy mane, commencing at the throat and falling as far as the knees. It is a native of North Africa, inhabiting the loftiest and most inaccessible precipices.

Apaches (à-pä'chez), a warlike race of Indians formerly inhabiting the more unsettled parts of the United States adjoining Mexico, and also the north of Mexico. They supported themselves by the chase and plunder and

put their prisoners to death with frightful tortures. After defying the U. S. army for many years they were finally subdued by Generals Crook and Miles, and are now on reservations in Arizona, New Mexico and Oklahoma. They have proved good workers on the irrigation dams in Arizona. Number, about 6000.

Apanage (ap'a-nāj), an allowance which the younger princes of a reigning house in some European countries receive from the revenues of the country, generally with a grant of public domains, that they may be enabled to live in a manner becoming their rank.

Apartment (a-part'ment) HOUSES, houses built to accommodate a number of families each in its own set of rooms, which form a separate dwelling with an entrance of its own. The term is chiefly used in America, where such dwellings are of comparatively recent introduction; but houses of this kind have long been built in Europe, though in London, as in the United States, they are still somewhat of a novelty. In New York and other American cities there are now great blocks of such houses.

Apatite (ap'a-tīt), a translucent but seldom transparent mineral, which crystallizes in a regular six-sided prism, usually terminated by a truncated six-sided pyramid. It passes through various shades of color, from white to yellow, green, blue, and occasionally red; luster is vitreous inclining to sub-resinous; cleavage imperfect; hardness 5 and specific gravity about 3.2. It is a compound of phosphate of lime with fluoride and chloride of calcium. It occurs principally in primitive rocks and in veins, extensive deposits being found in all parts of the world. It is now largely utilized as a source of artificial phosphate manure.

Ape (āp), a common name of a number of quadrumanous animals inhabiting the Old World (Asia and the Asiatic islands and Africa), and including a variety of species. The word *ape* is applied indiscriminately to all quadrumanous mammals, or specifically to the anthropoid or man-like monkeys. This family includes the chimpanzee, gorilla, orang-outang, and gibbon, and has been divided into three genera, *Troglodytes*, *Simia*, and *Hylobătes*. See *Chimpanzee*, *Gibbon*, *Gorilla*, *Orang*, etc.

Apeldoorn (ä'pel-dōrn), a town of Holland, province of Gelderland, 17 miles north of Arnhem; manufactures paper, morocco leather, and copper plates. Pop. 25,761.

Apelles (a-pel'ēz), the most famous of the painters of ancient Greece and of antiquity, was born in the fourth century B.C., probably at Colophon. Ephorus of Ephesus was his first teacher, but attracted by the renown of the Sicyonian school he went and studied at Sicyon. In the time of Philip he went to Macedonia, and there a close friendship between him and Alexander the Great was established. The most admired of his pictures was that of Venus rising from the sea and wringing the water from her dripping locks. His portrait of Alexander with a thunderbolt in his hand was no less celebrated. His renown was at its height about B.C. 330, and he died about the end of the century. Among the anecdotes told of Apelles is the one which gave rise to the Latin proverb, 'Ne sutor supra crepidam'—'Let not the shoemaker go beyond his shoe.' Having heard a cobbler point out an error in the drawing of a shoe in one of his pictures he corrected it, whereupon the cobbler took upon him to criticise the leg, and received from the artist the famous reply.

Apennines (ap'e-nīnz; Latin, *Mons Apenninus*), a prolongation of the Alps, forming the 'backbone of Italy.' Beginning at Savona, on the Gulf of Genoa, the Apennines traverse the whole of the peninsula and also cross over into Sicily, the Strait of Messina being regarded merely as a gap in the chain. The average height of the mountains composing the range is about 4,000 feet, and nowhere do they reach the limits of perpetual snow, though some summits exceed 9,000 feet in height. Monte Corno, a peak in the Gran Sasso d'Italia (Great Rock of Italy), which rises among the mountains if the Abruzzi, is the loftiest of the chain, rising to the height of 9541 feet, Monte Majella (9151) being next. Monte Gargano, which juts out into the Adriatic from the *ankle* of Italy, is a mountainous mass upwards of 3000 feet high, completely separated from the main chain. On the Adriatic side the mountains descend more abruptly to the sea than on the western or Mediterranean side, and the streams are comparatively short and rapid. On the western side are the valleys of the Arno, Tiber, Garigliano, and Volturno, the largest rivers that rise in the Apennines, and the only ones of importance in the peninsular portion of Italy. They consist almost entirely of limestone rocks, and are exceedingly rich in the finest marbles. On the south slopes volcanic masses are not uncommon. Mount Vesuvius, the only active volcano on the

continent of Europe, is an instance. The lower slopes are well clothed with vegetation; the summits are sterile and bare.

Apenrade (ä'pen-rä-de), a seaport of Prussia, in Schleswig-Holstein, on a fiord of the Little Belt, beautifully situated, and carrying on a considerable fishing and seafaring trade. Pop. 5,952.

Aperient (a-pē'ri-ent), a medicine which, in moderate doses, gently but completely opens the bowels: examples, castor-oil, Epsom salts, senna, etc.

Apetalous (a-pet'a-lus), a botanical term applied to flowers or flowering-plants which are destitute of petals or corolla.

Aphaniptera (af-a-nip'tĕr-a), an order of wingless insects, composed of the different species of fleas. See *Flea*.

Aphasia (a-fā'si-a), a word of Greek origin signifying, in pathology, a symptom of certain morbid conditions of the nervous system in which the patient loses the power of expressing ideas by means of words, or loses the appropriate use of words, the vocal organs the while remaining intact and the intelligence sound. There is sometimes an entire loss of words as connected with ideas, and sometimes only the loss of a few. In one form of the disease, called *aphemia*, the patient can think and write, but cannot speak; in another, called *agraphia*, he can think and speak, but cannot express his ideas in writing. In a great majority of cases, where post-mortem examinations have been made, morbid changes have been found in the left frontal convolutions of the brain.

Aphelion (a-fē'li-on; Gr. *apo*, from, and *hēlios*, the sun), that part of the orbit of the earth or any other planet in which it is at the point remotest from the sun.

Aphemia (a-fē'mi-a). See *Aphasia*.

Aphides (af'i-dēz). See *Aphis*.

Aphis (ā'fis), a genus of insects called plant-lice of the order Hemiptera, the type of the family Aphidēs. The species are very numerous and destructive. The *A. rosæ* lives on the rose; the *A. fabæ* on the bean; the *A. humŭli* is injurious to the hop, the *A. granaria* to cereals, the *A. lanigĕra* or woolly aphis equally so to apple trees. The aphides are furnished with an inflected beak, and feelers longer than the thorax. In the same species some individuals have four erect wings and others are entirely without wings. The feet are of the ambulatory kind, and the abdomen usually ends in two horn-like tubes, from which is ejected the substance called

Aphides.

Wheat Plant-louse (*Aphis granaria*).—1, 2, Male, enlarged and natural size. 3, 4, Wingless Female, enlarged and natural size.

honey-dew, a favorite food of ants. (See *Ant.*) The aphides illustrate parthenogenesis; hermaphrodite forms produced from eggs produce viviparous wingless forms, which again produce others like themselves, and thus multiply during summer, one individual giving rise to millions. Winged sexual forms appear late in autumn, the females of which, being impregnated by the males, produce eggs.

Aphonia (a-fō'ni-a; Gr. *a*, not, and *phōnē*, voice), in pathology, the greater or less impairment or the complete loss of the power of emitting vocal sound. The slightest and less permanent forms often arise from extreme nervousness, fright, and hysteria. Slight forms of structural aphonia are of a catarrhal nature, resulting from more or less congestion and tumefaction of the mucous and submucous tissues of the larynx and adjoining parts. Severer cases are frequently occasioned by serous infiltration into the submucous tissue, with or without inflammation of the mucous membrane of the larynx and of its vicinity. The voice may also be affected in different degrees by inflammatory affections of the fauces and tonsils; by tumors in these situations; by morbid growths pressing on or implicating the larynx or trachea; by aneurisms; and most frequently by chronic laryngitis and its consequences, especially thickening, ulceration, etc.

Aphorism (af'o-rizm), a brief, sententious saying, in which a comprehensive meaning is involved, as 'Familiarity breeds contempt;' 'Necessity has no law.'

Aphrodisiacs (a-fro-dis'i-aks), medicines or food believed to be capable of exciting sexual desire.

Aphrodite (af-ro-dī'tē), the goddess of love among the Greeks;

usually regarded as equivalent to the Roman Venus. A festival called Aphrodisia was celebrated to her in various parts of Greece, but especially in Cyprus. See *Venus*.

Aphthæ (af'thē), a disease occurring especially in infants, but occasionally seen in old persons, and consisting of small white ulcers upon the tongue, gums, inside of the lips, and palate, resembling particles of curdled milk: commonly called *thrush* or *milk-thrush*.

A'pia (ä'pē-ä), the chief place and trading center of the Samoan Islands, on the north side of the island of Upolu, capital of the German part of the group.

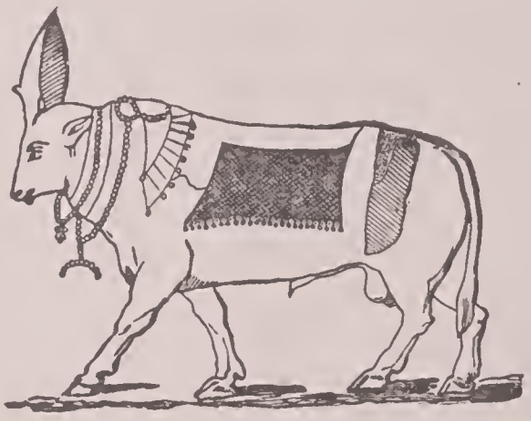
A'piary (ā'pi-a-ri; L. *apis*, a bee), a place for keeping bees. The apiary should be well sheltered from strong winds, moisture, and the extremes of heat and cold. The hives should face the south or southeast, and should be placed on shelves 2 feet above the ground, and about the same distance from each other. As to the form of the hives and the materials of which they should be constructed there are great differences of opinion. The old dome-shaped straw *skep* is still in general use among the cottagers of Great Britain. Its cheapness and simplicity of construction are in its favor, while it is excellent for warmth and ventilation; but it has the disadvantage that its interior is closed to inspection, and the honey can only be got out by stupefying the bees with the smoke of the common puff-ball, by chloroform, or by fumigating with sulphur, which entails the destruction of the swarm. Wooden hives of square box-like form have now gained general favor among bee-keepers. They usually consist of a large breeding chamber below and two sliding removable boxes called supers above for the abstraction of honey without disturbing the contents of the main chamber. It is of great importance that the apiary should be situated in the neighborhood of good feeding grounds, such as gardens, clover-fields, or heath-covered hills. In the early spring slow and continuous feeding (a few ounces of syrup each day) will stimulate the queen to deposit her eggs, by which means the colony is rapidly strengthened and throws off early swarms. New swarms may make their appearance as early as May and as late as August, but swarming usually takes place in the intervening months.

Apicius (a-pish'e-us), MARCUS GABIUS, a Roman epicure in the time of Augustus and Tiberius, who, having exhausted his vast fortune on the gratification of his palate, and having *only* about $400,000 left, poisoned himself that he might escape the misery of plain diet. The book of cookery published under the name of Apicius was written by one Cælius, and belongs to a much later date.

Apion (ā'pi-on), a Greek grammarian, born in Egypt, lived in the reigns of Tiberius, Caligula, and Claudius, A.D. 15–54, and went to Rome to teach grammar and rhetoric. Among his works, one or two fragments only of which remain, was one directed against the Jews, which was replied to by Josephus.

Apios (ā'pi-os), a genus of leguminous climbing plants, producing edible tubers on underground shoots. An American species (*A. apios*) has been used as a substitute for the potato, but its tubers, though numerous, are small.

Apis (ā'pis), a bull to which divine honors were paid by the ancient Egyptians, who regarded him as a symbol of Osiris. At Memphis he had a splendid residence, containing extensive walks and courts for his entertainment, and he was waited upon by a large train



Apis.

of priests, who looked upon his every movement as oracular. He was not suffered to live beyond twenty-five years, being secretly killed by the priests and buried with great pomp. Another bull, characterized by certain marks, as a black color, a triangle of white on the forehead, a white crescent-shaped spot on the breast, etc., was selected in his place. His birthday was annually celebrated, and his death was a season of public mourning.

Apis, a genus of insects. See *Bee*.

Apium (ā'pi-um), a genus of umbelliferous plants, including celery.

Aplacental (ap-la-sen'tal), a term applied to those mammals in which the young are destitute of a placenta. The aplacental mammals com-

prise the Monotremata and Marsupialia, the two lowest orders of mammals, including the duck-mole (ornithorhynchus), the porcupine ant-eater, kangaroo, etc. See *Marsupialia* and *Monotremata.*

Aplanatic (ap-la-nat'ik), in optics, a term specifically applied to reflectors, lenses, and combinations of them capable of transmitting light without spherical aberration. An *aplanatic lens* is a lens constructed of different media to correct the effects of the unequal refrangibility of the different rays.

Aplysia (a-plī'si-a). See *Sea-hare.*

Apocalypse (a-pok'a-lips; Gr. *apokalypsis*, a revelation), the name frequently given to the last book of the New Testament, in the English version called *The Revelation of St. John the Divine.* It is generally believed that the Apocalypse was written by the apostle John in his old age (95–97 A.D.) in the Isle of Patmos, whither he had been banished by the Roman Emperor Domitian. Anciently its genuineness was maintained by Justin Martyr, Irenæus, Clement of Alexandria, Tertullian, and many others; while it was doubted by Dionysius of Alexandria, Cyril of Jerusalem, Chrysostom, and, nearer our own times, by Luther and a majority of the eminent German commentators. The Apocalypse has been explained differently by almost every writer who has ventured to interpret it, and has furnished all sorts of sects and fanatics with quotations to support their creeds or pretensions. The modern interpreters may be divided into three schools—namely, the *historical school*, who hold that the prophecy embraces the whole history of the church and its foes from the time of its writing to the end of the world; the *Præterists*, who hold that the whole or nearly the whole of the prophecy has been already fulfilled, and that it refers chiefly to the triumph of Christianity over Paganism and Judaism; and the *Futurists*, who throw the whole prophecy, except the first three chapters, forward upon a time not yet reached by the church—a period of no very long duration, which is immediately to precede Christ's second coming.

Apocalyptic (a-pok-a-lip'tik) NUMBER, the mystic number 666 found in Rev., xiii, 18. As early as the second century ecclesiastical writers found that the name Antichrist was indicated by the Greek characters expressive of this number. By Irenæus the word *Lateinos* was found in the letters of the number, and the Roman empire was therefore considered to be Antichrist. Protestants generally believe it has reference to the papacy, and, on the other hand, Catholics connect it with Protestantism.

Apocarpous (ap-ō-kar'pus), in botany, a term applied to such fruits as are the product of a single flower, and are formed of one carpel, or a number of carpels free and separate from each other.

Apocrypha (a-pok'ri-fa; Greek, 'things concealed or spurious'), a term applied in the earliest churches to various sacred or professedly inspired writings, sometimes given to those whose authors were unknown, sometimes to those with a hidden meaning, and sometimes to those considered objectionable. The term is specially applied to the fourteen undermentioned books which were written during the two centuries preceding the birth of Christ. They were written, not in Hebrew, but in Greek, and the Jews never allowed them a place in their sacred canon. They were incorporated into the Septuagint, and thence passed to the Vulgate. The Greek Church excluded them from the canon in 360 at the Council of Laodicea. The Latin Church treated them with more favor, but it was not until 1546 that they were formally admitted into the canon of the Church of Rome by a decree of the Council of Trent. The Anglican Church says they may be read for example of life and instruction of manners, but that the church does not apply them to establish any doctrine. Fourteen books form the Apocrypha of the English Bible:—The first and second books of *Esdras*, *Tobit*, *Judith*, the rest of the *Book of Esther*, the *Wisdom of Solomon*, the *Wisdom of Jesus the son of Sirach*, or *Ecclesiasticus*, *Baruch the Prophet*, the *Song of the Three Children*, *Susanna and the Elders*, *Bel and the Dragon*, the *Prayer of Manasses*, and the first and second *Books of Maccabees.* Besides the Apocryphal books of the Old Testament there are many spurious books composed in the earlier ages of Christianity, and published under the names of Christ and his apostles, or of such immediate followers as from their character or means of intimate knowledge might give an apparent plausibility for such forgeries. These writings comprise: 1st, the *Apocryphal Gospels*, which treat of the history of Joseph and the Virgin before the birth of Christ, of the infancy of Jesus, and of the acts of Pilate; 2d, the *Apocryphal Acts of the Apostles;* and 3d, the *Apocryphal Apocalypses*, none of

which have obtained canonical recognition by any of the churches. See *Apocryphal Books of the New Testament.*

Apocynaceæ (ap-o-ci-nā'se-ē), a natural order of dicotyledonous plants, having for its type the genus *Apocynum* or dog-bane. The species have opposite or sometimes whorled leaves without stipules; the corolla monopetalous, hypogynous and with the stamens inserted upon it; fruit two-celled. The plants yield a milky juice, which is generally poisonous; several yield caoutchouc, and a few edible fruits. The bark of several species is a powerful febrifuge. To the order belongs the periwinkle (Vinca). See *Dog-bane, Cow-tree, Periwinkle, Oleander, Tanghin.*

Apoda (ap'ö-da; lit. footless animals), a name sometimes given to the snake-like or worm-like amphibians, as also to the apodal fishes (which see).

Ap'odal Fishes, the name applied to such malacopterous fishes as want ventral fins. They constitute a small natural family, of which the common eel is an example.

Apodosis (a-pod'ö-sis), in gram., the latter member of a conditional sentence or one beginning with *if, though,* etc.) dependent on the condition or *protăsis;* as, 'if it rain (*protasis*) I shall not go' (*apodosis*).

Apogee (ap'ö-jē; Greek, *apo,* from, and *gē,* the earth), that point in the orbit of the moon or a planet where it is at its greatest distance from the earth; properly this particular part of the moon's orbit.

Apol'da, a town of Germany, in Saxe-Weimar, at which woolen goods are extensively manufactured. Pop. 20,352.

Apollinarians (ap-ol-i-nā'ri-ans), a sect of Christians who maintained the doctrine that the Logos (the Word) holds in Christ the place of the rational soul, and consequently that God was united in him with the human body and the sensitive soul. Apollinaris, the author of this opinion, was, from A.D. 362 till at least A.D. 382, Bishop of Laodicea, in Syria, and a zealous opposer of the Arians. As a man and a scholar he was highly esteemed and was among the most popular authors of his time. He formed a congregation of his adherents at Antioch, and made Vitalis their bishop. The *Apollinarians,* or *Vitalians,* as their followers were called, soon spread their sentiments in Syria and the neighboring countries, established several societies, with their own bishops, and one even in Constantinople; but the sect was finally merged into the Monophysite school.

Apollinaris (a-pol-i-nā'ris) WATER, a natural aërated water, belonging to the class of alkaline mineral waters, and derived from the Apollinarisbrunnen, a spring in the valley of the Ahr, near the Rhine, in Rhenish Prussia, forming a highly esteemed beverage.

Apollo (a-pol'lo), son of Zeus (Jupiter) and Leto (Lotano), who being persecuted by the jealousy of Hera (Juno), after tedious wanderings and nine days' labor, was delivered of him and his twin sister, Artemis (Diana), on the island of Delos. Skilled in the use of the bow, he slew the serpent Python on the fifth day after his birth; afterwards, with his sister Artemis, he

Appollo, from a bas-relief at Rome.

killed the children of Niobē. He aided Zeus in the war with the Titans and the giants. He destroyed the Cyclops, because they forged the thunderbolts with which Zeus killed his son and favorite Asklepios (Æsculapius). According to some traditions, he invented the lyre, though this is generally ascribed to Hermes (Mercury). Apollo was originally the sun-god; and though in Homer he appears distinct from Helios (the sun), yet his real nature is hinted at even here by the epithet Phœbus, that is, the radiant or beaming. In later times the view was almost universal that Apollo and Helios were identical. From being the god of light and purity in a physical sense he gradually became the god of moral and spiritual light and purity, the source of all intellectual, social, and political progress. He thus came to be regarded as the god of song and prophecy, the

god that wards off and heals bodily suffering and disease, the institutor and guardian of civil and political order, and the founder of cities. His worship was introduced at Rome at an early period, probably in the time of the Tarquins. Among the ancient statues of Apollo that have come down to us, the most remarkable is the one called the *Apollo Belvidere*, from the Belvidere Gallery in the Vatican at Rome. This statue was found in the ruins of Antium in 1495, and was purchased by Pope Julian II. It is thought to be a copy of a Greek statue of the 3d century B.C., and to date from the reign of Nero.

Apollodorus (ap-pol-o-do'rus), a Greek painter who flourished 404 B.C. The first of the great school of Greek painters, elder contemporary of Zeuxis and Parrhasius. Considered the inventor of *chiaroscuro*. Among his works are an Odysseus, a priest in prayer, and an Ajax struck by lightning.

Apollonius (a-pol-lō'ni-ŭs) OF PERGA, Greek mathematician, called the 'great geometer,' flourished about 240 B.C., and was the author of many works, only one of which, a treatise on Conic Sections, partly in Greek and partly in an Arabic translation, is now extant.

Apollonius of Rhodes, a Greek rhetorician and poet, flourished about 230 B.C. Of his various works we have only the *Argonautica*, an epic poem of moderate merit, though written with much care and labor, dealing with the story of the Argonautic expedition.

Apollonius of Tyana, in Cappadocia, a Pythagorean philosopher, who was born in the beginning of the Christian era, early adopted the Pythagorean doctrines, abstaining from animal food and maintaining a rigid silence for five years. He traveled extensively in Asia, professed to be endowed with miraculous powers, such as prophecy and the raising of the dead, and was on this account set up by some as a rival to Christ. His ascetic life, wise discourses, and wonderful deeds obtained for him almost universal reverence, and temples, altars, and statues were erected to him. He died at Ephesus about the end of the first century. A narrative of his strange career, containing many fables, with, perhaps, a kernel of truth, was written by the Philostratus about a century later.

Apollonius of Tyre, the hero of a tale which had an immense popularity in the middle ages and which furnished the plot of Shakespere's *Pericles, Prince of Tyre*. The story, originally in Greek, first appeared in the third century after Christ.

Apollos (a-pol'los), a Jew of Alexandria, who learned the doctrines of Christianity at Ephesus from Aquila and Priscilla, became a preacher of the gospel in Achaia and Corinth, and an assistant of Paul in his missionary work. Some have regarded him as the author of the Epistle to the Hebrews.

Apollyon (a-pol'yun; 'the Destroyer'), a name used in Rev. ix, 11, for the angel of the bottomless pit.

Apologetics (a-pol-o-jet'iks), a term applied to that branch of theological learning which consists in the systematic exhibition of the arguments for the divine origin of Christianity. See *Evidence of Christianity*.

Apologue (ap'o-log), a story or relation of fictitious events intended to convey some useful truths. It differs from a parable in that the latter is drawn from events that pass among mankind, whereas the apologue may be founded on supposed actions of brutes or inanimate things. Æsop's fables are good examples of apologues.

Apology (a-pol'o-ji), a term at one time applied to a defense of one who is accused, or to certain doctrines called in question. Of this nature are the *Apologies of Socrates*, attributed respectively to Plato and Xenophon. The name passed over to Christian authors, who gave the name of apologies to the writings which were designed to defend Christianity against the attacks and accusations of its enemies, particularly the pagan philosophers, and to justify its professors before the emperors. Of this sort were those by Justin Martyr, Athenagoras, Tertullian, Tatian, and others.

Aponeurosis (ap-o-nū-rō'sis), in anatomy, a name of certain grayish-white lining membranes, composed of interlacing fibers, sometimes continuous with the muscular fiber, and differing from tendons merely in having a flat form. They serve several purposes, sometimes attaching the muscles to the bones, sometimes surrounding the muscle and preventing its displacement, etc.

Apophthegm (ap'o-them), a short pithy sentence or maxim. Plutarch made a famous collection of them, and we have a collection by Lord Bacon.

Apophyllite (a-pof'il-līt), a species of mineral of a foliated structure and pearly luster, called also fish-eye stone. It belongs to the Zeolite

family, and is a hydrated silicate of lime and potash, containing also fluorine.

Apoplexy (ap'o-plek-si), abolition or sudden diminution of sensation and voluntary motion, from suspension of the functions of the cerebrum, resulting from congestion or rupture of the blood-vessels of the brain and resulting pressure on this organ. In a complete apoplexy the person falls suddenly, is unable to move his limbs or to speak, gives no proof of seeing, hearing, or feeling, and the breathing is stertorous or snoring, like that of a person in deep sleep. The premonitory symptoms of this dangerous disease are drowsiness, giddiness, dullness of hearing, frequent yawning, disordered vision, noise in the ears, vertigo, etc. It is most frequent between the ages of fifty and seventy. A large head, short neck, full chest, sanguine and plethoric constitution, and corpulency are generally considered signs of predisposition to it; but the state of the heart's action, with a plethoric condition of the vascular system, has a more marked influence. Out of 63 cases carefully investigated only 10 were fat and plethoric, 23 being thin, and the rest of ordinary habit. Among the common predisposing causes are long and intense thought, continued anxiety, habitual indulgence of the temper and passions, sedentary and luxurious living, sexual indulgence, intoxication, etc. More or less complete recovery from a first and second attack is common, but a third is almost invariably fatal.

Aposiopesis (a-pō-sī-ō-pē'sis), in rhetoric, a sudden break or stop in speaking or writing, usually for mere effect or a pretense of unwillingness to say anything on a subject; as 'his character is such—but it is better I should not speak of *that*.'

Apostasy (a-pos'ta-si; Gr. *apostasis*, a standing away from), a renunciation of opinions or practices and the adoption of contrary ones, usually applied to renunciation of religious opinions. It is always an expression of reproach. What one party calls *apostasy* is termed by the other *conversion*. Catholics, also, call those persons *apostates* who forsake a religious order or renounce their religious vows without a lawful dispensation.

A posteriori (a pos-tē-ri-ō'ri). See *A priori*.

Apostles (a-pos'ls; literally persons sent out; from the Greek *apostellein*, 'to send out'), the twelve men whom Jesus selected to attend him during his ministry, and to promulgate his religion. Their names were as follows:—Simon Peter, and Andrew his brother; James, and John his brother, sons of Zebedee; Philip; Bartholomew; Thomas; Matthew; James, the son of Alpheus; Lebbeus, his brother, called *Judas* or *Jude;* Simon, the Canaanite; and Judas Iscariot. To these were subsequently added Matthias (chosen by lot in place of Judas Iscariot) and Paul. The Bible gives the name of apostle to Barnabas also, who accompanied Paul on his missions (Acts, xiv, 14). In a wider sense those preachers who first taught Christianity in heathen countries are sometimes termed apostles. During the life of Jesus the apostles more than once showed a misunderstanding of the object of his mission, and during his sufferings evinced little courage and firmness of friendship for their great Teacher. After his death, according to the Bible account, they received the Holy Ghost on the day of Pentecost, that they might be enabled to fulfill the important duties for which they had been chosen. Their subsequent history is only imperfectly known.

Apostles' Creed, a well-known formula or declaration of Christian belief, formerly believed to be the work of the apostles themselves, but it can only be traced to the 4th century. See *Creed*.

Apostolic (ap-os-tol'ik), APOSTOLICAL, pertaining or relating to the apostles.—*Apostolic Church*, the church in the time of the apostles constituted according to their design. The name is also given to the four churches of Rome, Alexandria, Antioch, and Jerusalem, and is claimed by the Roman Catholic Church, and occasionally by the Episcopalians.—*Apostolic Constitutions* and *Canons*, a collection of regulations attributed to the apostles, but generally supposed to be spurious. They appeared in the fourth century; are divided into eight books, and consist of rules and precepts relating to the duty of Christians, and particularly to the ceremonies and discipline of the church.—*Apostolic fathers*, the Christian writers who during any part of their lives were contemporary with the apostles. They are Papias, Clement, Barnabas, Hermas, Ignatius, Polycarp.—*Apostolic majesty*, a title given by the pope to the Kings of Hungary, first conferred on St Stephen, the founder of the royal line of Hungary on account of what he accomplished in the spread of Christianity.—*Apostolic see*, the see of the popes or bishops of Rome: so called because the popes profess themselves the successors of St. Peter, its founder.—*Apostolic succession*, the un-

interrupted succession of bishops, and, through them, of priests and deacons (these three orders of ministers being called the *apostolical orders*), in the church by regular ordination from the first apostles down to the present day. All Episcopal churches hold theoretically, and the Roman Catholic Church and many members of the English Church strictly, that such succession is essential to the officiating priest, in order that grace may be communicated through his administrations.

Apostol'ics, APOSTOLICI, or APOSTOLIC BRETHREN, the name given to certain sects who professed to imitate the manners and practice of the apostles. The last and most important of these sects was founded about 1260 by Gerhard Segarelli of Parma. They went barefooted, begging, preaching, and singing throughout Italy, Switzerland, and France; announced the coming of the kingdom of heaven and of purer times; denounced the papacy, and its corrupt and worldly church; and inculcated the complete renunciation of all worldly ties, of property, settled abode, marriage, etc. This society was formally abolished, 1286, by Honorius IV. In 1300 Segarelli was burned as a heretic, but another chief apostle appeared—Dolcino, a learned man of Milan. In self-defense they stationed themselves in fortified places whence they might resist attacks. After having devastated a large tract of country belonging to Milan they were subdued, A.D. 1307, by the troops of Bishop Raynerius, in their fortress Zebello, in Vercelli, and almost all destroyed. Dolcino met death by torture. The survivors afterwards appeared in Lombardy and in Germany as late as 1403.

Apostrophe (a-pos'trō-fē; Greek, 'a turning away from'), a rhetorical figure by which the orator changes the course of his speech, and makes a short impassioned address to one absent as if he were present, or to things without life and sense as if they had life and sense. The same term is also applied to a comma when used to contract a word, or to mark the possessive case, as in 'John's book.'

Apothecaries' Weight, the weight used in dispensing drugs, in which the pound (lb.) is divided into 12 ounces (℥), the ounce into 8 drachms (℥), the drachm into 3 scruples (℈), and the scruple into 20 grains (grs.), the grain being equivalent to that in avoirdupois weight.

Apothecary (a-poth'e-ka-ri), in a general sense, one who keeps a shop or laboratory for preparing, compounding, and vending medicines, and for the making up of medical prescriptions. In England the term was long applied (as to some little extent still) to a regularly licensed class of medical practitioners, being such persons as were members of, or licensed by, the *Apothecaries' Company* in London. The apothecaries of London were at one time ranked with the grocers, with whom they were incorporated by James I in 1606. In 1617, however, the apothecaries received a new charter as a distinct company. The Apothecaries' Company have prescribed a course of medical instruction and practice for candidates for the license of the society. In the United States the several States have laws controlling apothecaries.

Apothecium (ap-ō-thē'si-um), in botany, the receptacle of lichens, consisting of the spore-cases or asci, and of the paraphyses or barren threads.

Apotheosis (ap-ō-thē-ō'sis; deification), a solemnity among the ancients by which a mortal was raised to the rank of the gods. The custom of placing mortals who had rendered their countrymen important services, among the gods was very ancient among the Greeks. The Romans, for several centuries, deified none but Romulus, and first imitated the Greeks in the fashion of frequent apotheosis after the time of Cæsar. From this period apotheosis was regulated by the decrees of the senate, and accompanied with great solemnities. The greater part of the Roman emperors were deified.

Appalachian Mountains (ap-pa-lā'chi-an), also called ALLEGHANIES, an important mountain range in N. America extending for 1300 miles from Cape Gaspé, on the Gulf of St. Lawrence, S.W. to Alabama. The system has been divided into three great sections: the *northern* (including the Adirondacks, the Green Mountains, the White Mountains, etc.), from Cape Gaspé to New York; the *central* (including a large portion of the Blue Ridge, the Alleghanies proper, and numerous lesser ranges), from New York to the valley of the New River; and the *southern* (including the continuation of the Blue Ridge, the Black Mountains, the Smoky Mountains, etc., from the New River southwards). The chain consists of several ranges generally parallel to each other, the altitude of the individual mountains increasing on approaching the south. The highest peaks rise over 6600 feet (not one at all approaching the snow-level), but the mean height is about 2500

Courtesy Link-Belt Co., Philadelphia

A BITUMINOUS COAL MINE IN THE APPALACHIAN PLATEAU

The coal layer is located near the top of the slope; a conveyor brings the coal down to the tipple, where it is screened, separated into different sizes, and loaded into coal cars.

feet. Lake Champlain is the only lake of great importance in the system, but numerous rivers of considerable size take their rise here. Magnetite, hematite, and other iron ores occur in great abundance, and the coal-measures are among the most extensive in the world. Gold, silver, lead, and copper are also found, but not in paying quantities, while marble, limestone, fire-clay, gypsum, and salt abound. The forests covering many of the ranges yield large quantities of valuable timber, such as sugar-maple, white birch, beech, ash, oak, cherry-tree, white poplar, white and yellow pine, etc., while they form the haunts of large numbers of bears, panthers, wild cats, and wolves.

Appalachian Park. For a considerable number of years efforts were made to have Congress set aside the large areas in the southern Appalachians covered by hardwood timber as a national park, as a means of conserving the head-waters of the streams which flow there. A bill for this purpose was passed in 1911, also including the White Mountains of New England, the United States agreeing to coöperate with the States in the cost of this important enterprise.

Appalachicola (ap-a-la-chi-cō'la), a river of the United States, formed by the Chattahoochee and Flint Rivers, which unite near the northern border of Florida; length, about 100 miles; flows into the Gulf of Mexico, and is navigable.

Appanage. See *Apanage.*

Apparent (ap-pā'rent), among mathematicians and astronomers, applied to things as they appear to the eye, in distinction from what they really are. Thus they speak of apparent motion, magnitude, distance, height, etc. The *apparent magnitude* of a heavenly body is the angle subtended at the spectator's eye by the diameter of that body, and this, of course, depends on the distance as well as the real magnitude of the body; *apparent motion* is the motion a body seems to have in consequence of our own motion, as the motion of the sun from east to west, etc.

Apparition (ap-a-rish'un), according to a belief held by some, a disembodied spirit manifesting itself to mortal sight; according to the theory more generally entertained, an illusion involuntarily generated, by means of which figures or forms, not present to the actual sense, are nevertheless depicted with a vividness and intensity sufficient to create a temporary belief of their reality. Such illusions are now generally held to result from an overexcited brain, a strong imagination, or some bodily malady. This theory explains satisfactorily a large majority of the stories of apparitions; still there are some which it seems insufficient to account for.

Appeal (a-pēl'), in legal phraseology, the removal of a cause from an inferior tribunal to a superior, in order that the latter may revise, and if it seem needful, reverse or amend, the decision of the former. The supreme court of appeal for Great Britain is the House of Lords. In Ireland there is also a Court of Appeal similar to that in England; while in Scotland the highest court is the Court of Session. In the United States the system of appeals differs in different States. In legislative bodies, an appeal is the act by which a member, who questions the correctness of a decision of the presiding officer, or chairman, demands a vote of the body upon the decision. In the House of Representatives of the United States the question of an appeal is put to the House in this form: 'Shall the decision of the chair stand as the judgment of the House?' If the appeal relates to an alleged breach of decorum, or transgression of the rules of order, the question is taken without debate. If it relates to the admissibility or relevancy of a proposition, debate is permitted, except when a motion for the previous question is pending.

Appendicitis (ap-pen-di-sī'tis), inflammation of the vermiform appendix, caused by obstructions at the mouth of the appendix or by extension of inflammation from the colon. It was formerly believed that foreign bodies, such as grape and other small seeds, were the main cause. This theory is now generally discarded. The appendix becomes swollen and filled with pus, tending to rupture, and peritonitis may result. Surgical operation for the removal of the appendix is justified in acute and repeated attacks.

Appenzell (ăp'pen-tsel), a Swiss canton, wholly enclosed by the canton of St. Gall; area, 162 square miles. It is divided into two independent portions or half-cantons, Ausser-Rhoden, which is Protestant, and Inner-Rhoden, which is Catholic. It is an elevated district, traversed by branches of the Alps, Mount Sentis in the center being 8250 feet high. It is watered by the Sitter and by several smaller affluents of the Rhine. Glaciers occupy the higher valleys. Pop. 68,780.

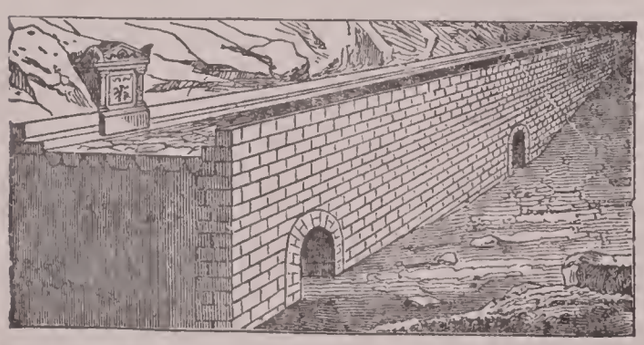
Appetite (ap'e-tīt), in its widest sense, means the natural desire for gratification, either of the body

or the mind; but is generally applied to the recurrent and intermittent desire for food. A healthy appetite is favored by work, exercise, plain living, and cheerfulness; absence of this feeling, or defective appetite (*anorexia*), indicates diseased action of the stomach, or of the nervous system or circulation, or it may result from vicious habits. Depraved appetite (*pica*), or a desire for unnatural food, as chalk, ashes, dirt, soap, etc., depends often in the case of children on vicious tastes or habits; in grown-up persons it may be symptomatic of dyspepsia, pregnancy, or chlorosis. Insatiable or canine appetite or voracity (*bulimia*) when it occurs in childhood is generally symptomatic of worms; in adults common causes are pregnancy, vicious habits, and indigestion caused by stomach complaints or gluttony, when the gnawing pains of disease are mistaken for hunger.

Appian (ap'pi-an), a Roman historian of the second century after Christ, a native of Alexandria, was governor and manager of the imperial revenues under Hadrian, Trajan, and Antoninus Pius, in Rome. He compiled in Greek a Roman history, from the earliest times to those of Augustus, in twenty-four books, of which only eleven have come down to us—of little value.

Appiani (äp·pi-ä'nē), ANDREA, a painter, born at Milan in 1754, died in 1817. As a fresco-painter he excelled every contemporary painter in Italy. He displayed his skill particularly in the cupola of Santa Maria di S. Celso at Milan, and in the paintings representing the legend of Cupid and Psyche, prepared for the walls and ceiling of the villa of the Archduke Ferdinand at Monza (1795). Napoleon appointed him royal court painter, and portraits of almost the whole of the imperial family were painted by him.

Appian Way, called *Regina Viarum*, the Queen of Roads: the oldest and most renowned Roman road, was constructed during the censorship of Appius Claudius Cæcus (B.C. 313–310). It was built with large square stones on a raised platform, and was made direct from the gates of Rome to Capua, in Campania. It was afterwards extended through Samnium and Apulia to Brundusium, the modern Brindisi. It was partially restored by Pius VI, and in 1850–53 it was excavated by order of Pius IX as far as the eleventh milestone from Rome.



Construction of a Portion of the Appian Way.

Appius Claudius (ap'pi-us cla'di-us), surnamed *Cæcus*, or the blind, an ancient Roman, elected censor B.C. 312, which office he held five years. While in this position he instituted several great constitutional changes, and constructed the road and aqueduct named after him. He was subsequently twice consul, and once dictator. In his old age he became blind, but in B.C. 280 he made a famous speech in which he induced the senate to reject the terms of peace fixed by Pyrrhus. He is the earliest Roman writer of prose and verse whose name we know.

Appius Claudius Crassus, one of the Roman *decemvirs*, appointed B.C. 451 to draw up a new code of laws. He and his colleagues plotted to retain their power permanently, and at the expiration of their year of office refused to give up their authority. The people were incensed against them, and the following circumstances led to their overthrow. Appius Claudius had conceived an evil passion for Virginia, the daughter of Lucius Virginius, then absent with the army in the war with the Æqui and Sabines. At the instigation of Appius, Marcus Claudius, one of his clients, claimed Virginia as the daughter of one of his own female slaves, and the decemvir, acting as judge, decided that in the meantime she should remain in the custody of the claimant. Virginius, hastily summoned from the army, appeared with his daughter next day in the forum, and appealed to the people; but Appius Claudius again adjudged her to M. Claudius. Unable to rescue his daughter, the unhappy father stabbed her to the heart. The decemvirs were deposed by the indignant people B.C. 449, and Appius Claudius died in prison or was strangled.

Apple (ap'l; Pyrus Malus), the fruit of a well-known tree of the nat. order Rosaceæ, or the tree itself. The apple belongs to the temperate regions of the globe, over which it is almost universally spread and cultivated. The tree attains a moderate height, with spreading branches, the leaf is ovate; and the flowers are produced from the wood of the former year, but more generally from

very short shoots or spurs from wood of two years' growth. The original of all the varieties of the cultivated apple is the wild crab, which has a small and extremely sour fruit, and is a native of most of the countries of Europe. To the facility of multiplying varieties by grafting is to be ascribed the amazing extension of the sorts of apples. Many of the more marked varieties are known by general names, as pippins, codlins, rennets, etc. Apples for the table are characterized by a firm juicy pulp, a sweetish acid flavor, regular form, and beautiful coloring; those for cooking by the property of forming by the aid of heat into a pulpy mass of equal consistency, as also by their large size and keeping properties; apples for cider must have a considerable degree of astringency, with richness of juice. The propagation of apple trees is accomplished by seeds, cuttings, suckers, layers, budding, or grafting, the last being almost the universal practice. The tree thrives best in a rich deep loam or marshy clay, but will thrive in any soil provided it is not too wet or too dry. The wood of the apple tree or the common crab is hard, close-grained, and often richly colored, and is suitable for turning and cabinet work. The fermented juice (*verjuice*) of the crab is employed in cookery and medicine. Cider, the fermented juice of the apple, is a favorite drink in many parts of the United States. The designation apple, with various modifying words, is applied to a number of fruits having nothing in common with the apple proper, as alligator-apple (which see), love-apple (see *Tomato*), etc.

Appleby (ap'p'l-bē), county town of Westmoreland, England, on the Eden, 28 miles S. S. E. Carlisle, giving its name to a parliamentary division of the county. It has an old castle, the keep of which, called Cæsar's Tower, is still fairly preserved. Pop. 1736.

Apple of discord, according to the story in the Greek mythology, the golden apple thrown into an assembly of the gods by the goddess of discord (Eris) bearing the inscription 'for the fairest.' Aphrodītē (Venus), Hera (Juno), and Pallas (Minerva) became competitors for it, and its adjudication to the first by Paris so inflamed the jealousy and hatred of Hera to all of the Trojan race (to which Paris belonged) that she did not cease her machinations till Troy was destroyed.

Apple of Sodom. See *Sodom, Apple of.*

Appleton (ap'p'l-tun), a city, county seat of Outagamie county, Wisconsin, on Fox River, 88 miles N. W. of Milwaukee; terminal of Wisconsin & Northern R. R.; also served by Chicago & N. W. and the Chicago, Milwaukee & St. Paul R. Rs. Trading center for rich dairying district. It has abundant water power operating many flour, paper, saw and woolen mills, iron works, etc. It is the seat of Lawrence College (Methodist Episcopal). Pop. (1920) 19,561.

Appoggiatura (ăp-poj-ä-tö'rä), in music, a small additional note of embellishment preceding the note to which it is attached, and taking away from the principal note a portion of its time.

Appomattox (a-pō-mat'oks). COURT-HOUSE, a village in Virginia, 23 m. E. of Lynchburg. Here on 9th April, 1865, Gen. Lee surrendered to Gen. Grant, and thus virtually concluded the American Civil war.

Apposition (ap-o-zish'un), in grammar, the relation in which one or more nouns or substantive phrases or clauses stand to a noun or pronoun, which they explain or characterize without being predicated of it, and with which they agree in case; as Cicero, the *orator*, lived in the first century before Christ; the opinion, *that a severe winter is generally followed by a good summer*, is a vulgar error.

Appraiser (a-prāz'er), one who appraises; a person appointed and sworn to set a value upon things to be sold or otherwise requiring appraisement.

Apprehension (ap-rē-hen'shun), the capture of a person upon a criminal charge. The term *arrest* is applied to civil cases; as, a person having authority may *arrest* on *civil* process, and *apprehend* on a *criminal* warrant. See *Arrest.*

Apprentice (a-pren'tis), one bound by indenture to serve some particular individual for a specified time, in order to be instructed in some art, science, or trade. At common law an infant may bind himself apprentice by indenture, because it is for his benefit. But this contract, on account of its liability to abuse, has been regulated by statute in the United States, and is not binding upon the infant unless entered into by him with the consent of the parent or guardian, or by the parent or guardian for him, with his consent. The duties of the master are, to instruct the apprentice by teaching him the knowledge of the art which he had undertaken to teach him, though he will be excused for not making a good workman if the apprentice is incapable of learning the trade. He cannot dismiss his apprentice except

by consent of all the parties to the indenture. An apprentice is bound to obey his master in all his lawful commands, take care of his property, and promote his interests, and endeavor to learn his trade or business, and perform all the covenants in his indenture not contrary to law. He must not leave his master's service during the term of his apprenticeship. The custom of apprenticing has greatly declined of late years in this country, and manual training and trade schools have been instituted for the teaching of the use of tools in various trades.

Approaches (a-prōch'es), zigzag trenches made to connect the parallels in besieging a fortress.

Appropriation (a-prō-pri-ā'shun), an act of a legislative body setting aside a sum of money from the treasury for a specific purpose. In the United States no money can be drawn from the U. S. government treasury except in consequence of appropriations made by Congress (Constitution, Art. I). Under this clause it is necessary for Congress to appropriate money for the support of the Federal government and in payment of claims against it. In the House of Representatives appropriation bills have precedence. Similar laws exist in the several States and in Britain and other countries.

Approximation (a-prok-si-mā'shun), a term used in mathematics to signify a continual approach to a quantity required, when no process is known for arriving at it exactly. Although, by such an approximation, the exact value of a quantity cannot be discovered, yet, in practice, it may be found sufficiently correct; thus the diagonal of a square, whose sides are represented by unity, is $\sqrt{2}$, the exact value of which quantity cannot be obtained; but its approximate value may be substituted in the nicest calculations.

Appuleius (ap-pū-lē'us). See *Apuleius*.

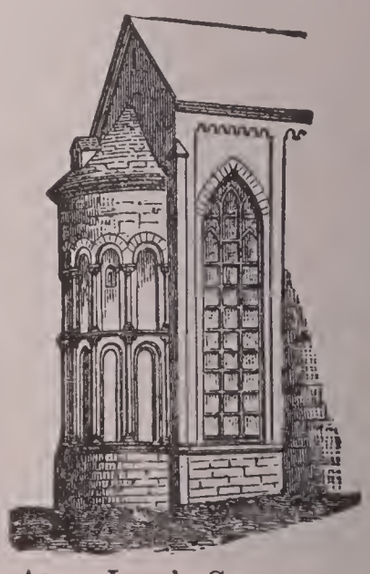
Apricot (āp'ri-kot; *Prunus Armeniăca*), a fruit of the plum genus which was introduced into Europe from Asia more than three centuries before Christ, and into England in the first half of the sixteenth century. It is a native of Armenia and other parts of Asia and also of Africa. The apricot is a low tree, of rather crooked growth, with somewhat heart-shaped leaves and sessile flowers. The fruit is sweet, more or less juicy, of a yellowish color, about the size of the peach, and somewhat resembling it in delicacy of flavor. The wood is coarsely grained and soft. Apricot trees have been introduced into California, where they are largely grown.

Apries (ā'pri-ēz), Pharaoh-Hophra of Scripture, the fourth king of the twenty-sixth Egyptian dynasty. He succeeded his father Psammetichus in 590 or 588 B. C. The Jews under Zedekiah revolted against their Babylonian oppressors and allied themselves with Apries, who was, however, unable to raise the siege of Jerusalem, which was taken by Nebuchadnezzar. A still more unfortunate expedition against Cyrene brought about revolt in his army, in endeavoring to suppress which Apries was defeated and slain about B.C. 569.

April (ā'pril; Lat. *Aprīlis*, from *aperire*, to open, because the buds open at this time), the fourth month of the year. The strange custom of making fools on the 1st April by sending people upon errands and expeditions which end in disappointment, and raise a laugh at the expense of the person sent has long prevailed. It has been connected with the miracle plays of the middle ages, in which the Saviour was represented as having been sent, at this period of the year, from Annas to Caiphas and from Pilate to Herod. In France the party fooled is called *un poisson d'avril*, 'an April fish.'

A priori (ā prī-o'ri; 'from what goes before'), a phrase applied to a mode of reasoning by which we proceed from general principles or notions to particular cases, as opposed to *a posteriori* ('from what comes after') reasoning, by which we proceed from knowledge previously acquired. Mathematical proofs are of the *a priori* kind; the conclusions of experimental science are *a posteriori*. It is also a term applied to knowledge independent of all experience.

Apse (aps), a portion of any building forming a termination or projection semicircular or polygonal in plan, and having a roof forming externally a semidome or semicone, or having ridges corresponding to the angles of the polygon; especially such a semicircular or polygonal recess projecting from the east

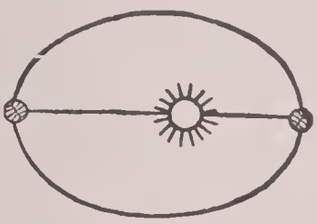


Apse—Laach, Germany.

end of the choir or chancel of a church, in which the altar is placed. The apse was developed from the somewhat similar part of the Roman basilicæ, in which the magistrate (*prætor*) sat.

Apsheron (äp'sha-ron), a peninsula on the western shore of the Caspian Sea formed by the eastern extremity of the Caucasus Mountains. It extends for about 40 m., and terminates in Cape Apsheron. It yields immense quantities of petroleum. See *Baku*.

Apsis (ap'sis), pl. AP'SIDES or APSI'DES, in astronomy one of the two points of the orbit of a heavenly body situated at the extremities of the major axis of the ellipse formed by the orbit, one of the points being that at which the body is at its greatest and the other that at which it is at its least distance from its primary. In regard to the earth and the other planets, these two points correspond to the aphelion and perihelion; and in regard to the moon they correspond to the apogee and perigee. The line of the apsides has a slow forward angular motion in the plane of the planet's orbit, being retrograde only in Venus. This in the earth's orbit produces the anomalistic year. See *Anomaly*.



a a, Apsides.

Apt (äpt; anc. *Apta Julia*), a town of southern France, department Vaucluse, 32 miles E. by S. of Avignon, with an ancient Gothic cathedral. Pop. 4990.

Aptera (ap'te-ra), wingless insects, such as lice and certain others.

Apteryx (ap'tėr-iks), a nearly extinct genus of cursorial birds, distinguished from the ostriches by having three toes with a rudimentary hallux, which forms a spur. They are natives of the South Island of New Zealand; are totally wingless and tailless, with feathers resembling hairs; about the size of a small goose; with long curved beak something like that of a curlew. They are entirely nocturnal, feeding on insects, worms, and seeds.—*A. australis*, called *Kiwi-kiwi* from its cry, is the best-known species.

Apuleius, or APPULEIUS (ap-ū-lē'us), author of the celebrated satirical romance in Latin called the *Golden Ass*, born at Madaura, in Numidia, in the early part of the second century A.D.; the time of his death unknown. He studied at Carthage, then at Athens, where he became warmly attached, in particular, to the Platonic philosophy, and finally at Rome. Returning to Carthage he married a rich widow, whose relatives accused him of gaining her consent by magic, and the speech by which he successfully defended himself is still extant. Besides his *Golden Ass*, with its fine episode of *Cupid and Psyche*, he was also the author of many works on philosophy and rhetoric, some of which are still extant.

Apulia (a-pū'li-a), a department or division in the southeast of Italy, on the Adriatic, composed of the provinces of Foggia, Bari, and Lecce; area, 7376 sq. miles; pop. 1,959,668.

Apure (å-pö'rā), a navigable river of Venezuela, formed by the junction of several streams which rise in the Andes of Colombia; it falls into the Orinoco.

Apurimac (å-pö-rē'mäk), a river of South America, which rises in the Andes of Peru, and being augmented by the Mantaro and other streams forms the Ucayale, one of the principal headwaters of the Amazon. It is not navigable.

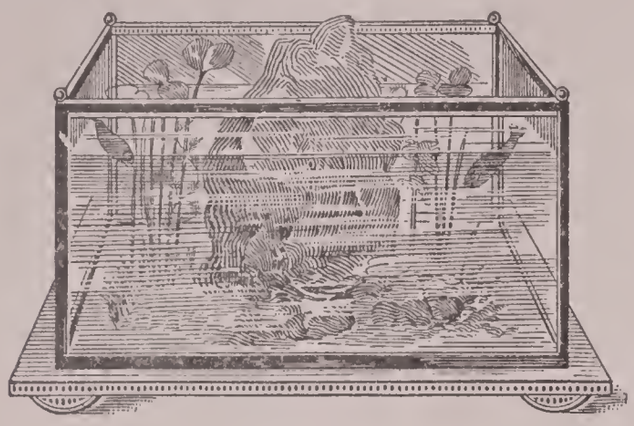
Aqua (ā'kwa or ak'wa; Latin for water), a word much used in pharmacy and old chemistry.—*Aqua fortis* (=strong water), a weak and impure nitric acid. It has the power of eating into steel and copper, and hence is used by engravers, etchers, etc.—*Aqua marina*, a fine variety of beryl. See *Aquamarine*.—*Aqua regia*, or *aqua regalis* (=royal water), a mixture of nitric and hydrochloric acids (in the proportion of one to four), having the power of dissolving gold and other noble metals.—*Aqua Tofana*, a poisonous fluid made about the middle of the seventeenth century by an Italian woman Tofana or Toffania, who is said to have procured the death of no fewer than 600 individuals by means of it. It consisted chiefly, it is supposed, of a solution of crystallized arsenic.—*Aqua vitæ* (=water of life), or simply *aqua*, a name familiarly applied to the *whisky* of Scotland, corresponding in meaning with the *usquebaugh* of Ireland, the *eau de vie* (brandy) of the French.

Aqua Fortis. See preceding article.

Aquamarine (ā'kwa-ma-rēn), a name given to some of the finest varieties of beryl of a sea-green or blue color. Hence applied to a bluish-green color resembling that of beryl.

Aquarium (a-kwā'ri-um), a vessel or series of vessels constructed wholly or partly of glass and containing salt or fresh water in which are kept living specimens of marine or fresh-

water animals along with aquatic plants. In principle the aquarium depends on the interdependence of animal and vegetable life; animals consuming oxygen and exhaling carbonic acid, plants reversing the process by absorbing carbonic acid and giving out oxygen. The aquarium must consequently be stocked both with plants and animals, and for the welfare of both something like a proper proportion should exist between them. The simplest form of aquarium is that of a glass vase; but aquariums on a larger scale consist of a tank or a number of tanks with plate-glass sides and stone floors, and contain sand and gravel, rocks, sea-weeds, etc. By improved arrangements light is admitted from above, passing through the water in the tanks and illuminating their contents, while the spectator is in comparative darkness. Aquariums on a large scale have been constructed in connection with public parks or gardens, and the name is also given to places of public entertainment in which large aquariums are exhibited.



Aquarium

Aquarius (a-kwā′ri-us), the Water-bearer; a sign in the zodiac which the sun enters about the 21st of January. Its symbol represents part of a stream of water, probably in allusion to the rains occurring at this season.

Aquatint (ak′wa-tint), a method of etching on copper by means of nitric acid, with an effect resembling a fine drawing in sepia or Indian ink. The special character of the effect is the result of sprinkling finely powdered resin or mastic over the plate, and causing this to adhere by heat, the design being previously etched, or being now traced out. The nitric acid (aqua fortis) acts only in the interstices between the particles of resin or mastic, thus giving a slightly granular appearance.

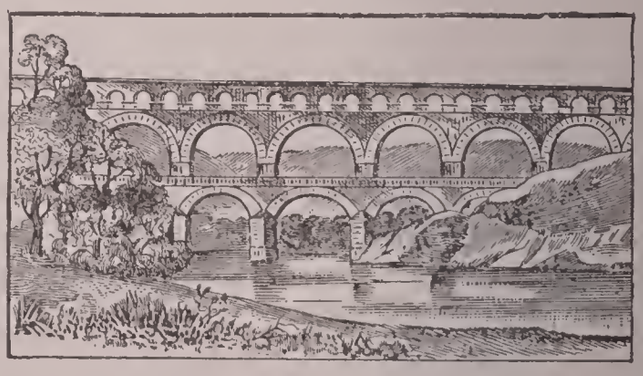
Aqua Tofana. See *Aqua.*

Aqua Vitæ See *Aqua*

Aquaviva (ä′kwȧ-vē′vȧ), Claudio (1543-1615), the fifth Jesuit general and one of the greatest.

Aqueduct (ak′wē-dukt; Lat. *aqua*, water, *duco*, to lead), an artificial channel or conduit for the conveyance of water from one place to another; more particularly applied to structures for conveying water from distant sources for the supply of large cities. Aqueducts may be below ground, on the surface, or raised on walls; it is to the last form of construction that the term is popularly applied. Aqueducts, mainly open canals, existed in Egypt, Babylonia and Assyria. Among the Phœnicians much engineering skill was displayed in the building of works for conveying water to the inhabitants of cities. The conduits that supplied Jerusalem are of great interest, and of high antiquity, going back probably to the times of the Kings of Judah. The Greeks, who perhaps derived their ideas in this connection from the Phœnicians, were the first in Europe to attempt to solve the problem of water supply. The works at Samos (625 B. C.) anticipated modern construction by the use of a tunnel over half a mile long through which water was led from its source to the masonry conduits of the city. Similar extensive works were carried out at Athens.

Aqueducts were extensively used by the Romans, and many of them still remain in different places on the Continent of Europe, some being still in use. The Pont du Gard in the south of France,



The Pont du Gard Aqueduct

14 m. from Nismes, is still nearly perfect, and is a grand monument of the Roman occupation of that country. The ancient aqueducts were constructed of stone or brick, sometimes tunneled through hills, and carried over valleys and rivers on arches. The Pont du Gard is built of great blocks of stone; its height is 160 feet; length of the highest arcade 882 ft. The aqueduct at Segovia, originally built by the Romans, has in some parts two

tiers of arcades 100 feet high, is 2921 feet in length, and is one of the most admired works of antiquity. In Italy the Spoleto aqueduct, 60 miles N. E. of Rome, forms a link between the ancient Roman aqueducts and the structures of modern times. It dates from the 6th century, is 300 ft. high and about 700 feet long, and is used both as bridge and aqueduct. The Maintenon aqueduct in France was begun by Louis XIV, to carry the water of the Eure from Point Gouin to Versailles. It is said that 40,000 soldiers were employed on the work. It was never completed. In England the Manchester aqueduct was constructed to bring water from Longendale to Manchester. The system for conveying water from Lake Thirlmore to Cumberland, constructed 1885–94, extends nearly 100 miles, thus rivaling in length the most recent of modern structures. There are 13¾ miles in tunnels, 38 miles in shallow tunnels cut from the surface, and 44½ miles in siphon pipes of 40 in. diameter. The Birmingham water-supply has an aqueduct of 73 miles in length. The Glasgow aqueduct, to convey water from Loch Katrine to the city is 35 miles long. The Liverpool aqueduct to bring the water of the river Vyrnwy in Wales to Liverpool has a total length of 68 miles. Of modern Continental aqueducts one of the most notable is that of Vienna, 60 miles long, starting at the foot of the Styrian Alps, 1150 ft. above the level of the Danube at Vienna. The Bombay aqueduct, in British India, brings the water supply of the city from the river Tansa, 65 miles N. of Bombay. The latest projects in aqueduct building are the two immense structures lately completed in the extreme east and the extreme west of the United States. The Catskill aqueduct, constructed to afford the city of New York an increase in its water supply, is the most notable example of the tunnel type of aqueduct in the world. Through it the collected waters of sections of the Catskill Mountains, 100 miles distant, are delivered to the five boroughs of New York City. At the Ashokan Reservoir, 590 feet above sea level, the waters of Esopus Creek are impounded by dams and form a lake 12 miles long by 3 miles in width, which contains 130,000,000,000 gallons. The tunnel system which conveys this water to the city is of four types of construction: cut-and-cover, that is, a concrete tunnel built in an excavated trench and covered with rock or earth; grade tunnel, bored through mountains and hills, at the same level as the adjacent aqueduct; steel pipe siphon, used to cross narrow valleys where the rock is not sufficiently solid to permit a deep conduit; and pressure tunnel, for carrying the aqueduct under the bed of large streams, lakes, etc. The cut-and-cover form was used wherever possible. There are about 55 miles of this, approximately horseshoe-shape in section, 17 feet 6 inches wide and 17 feet high inside. There are 24 grade tunnels, making up 14 miles of the length of the aqueduct. Their dimensions are 13 feet 4 inches by 17 feet high. The steel pipe siphon was used in several places where the rock was not solid enough to allow of tunneling. The pipes are ¾ inch thick, riveted, lined with concrete 2 inches thick, and are from 9 to 11 feet inside diameter. They are in three rows and are covered externally by a heavy layer of concrete. The pressure tunnels, of which there are seven, are driven through rock at great depth. They are 14 feet 6 inches in diameter, and are lined with concrete; they connect at each of their ends with a vertical shaft in the adjoining section of the aqueduct. The deepest of these is that under the Hudson, at a depth of 1100 feet below water level at mean tide. This tunnel is 3000 feet long. In all there are 17 miles of pressure tunnels. Kensico Reservoir, 30 miles from the city, is a storage basin of 40,000,000,000 gallons capacity, to be used in emergencies or interruption of flow from the Ashokan. The system of a length of 92 miles terminates at Hill View Reservoir, 15 miles farther south. By a continuation of the deep pressure system, 18 miles in length, from the city line at Yonkers to Brooklyn, the Catskill water is delivered to the city boroughs. The water flows by gravity all the way and rises under its own head to 265 feet in the city. It is calculated that the water supply will be increased by 250,000,000 gallons daily. The work was begun in 1906 and completed at a cost of $375,000,000.

The Los Angeles aqueduct is in extent of ground covered even a more stupendous undertaking than the Catskill tunnels. It is designed to bring the waters from the Owens River Valley in the Sierra Nevada range, to the city of Los Angeles, a distance of 240 miles. The main features of construction are similar to the Catskill aqueduct, with rather more exposed construction and less tunneling in the Los Angeles system than in the Catskill. The aqueduct delivers 265,000,000 gallons of water to the city daily, and a further development of the system is planned to insure the generation of 120,000 horsepower electric energy. The work was commenced in 1908; completed in 1913.

Aqueous (ā′kwe-use or a′kwe-us) HUMOR, the limpid watery fluid which fills the space between the cornea and the crystalline lens in the eye.

Aqueous rocks, mechanically formed rocks, composed of matter deposited by water. Called also *sedimentary* or *stratified rocks.* See *Geology.*

Aquifoliaceæ (ak-wē-fol-i-ā'ce-ē), an order of plants; the holly tribe. The species consist of trees and shrubs, and the order includes the common holly (*Ilex aquifolium*) and the *I. paraguariensis,* or Paraguayan tea tree.

Aquila (åk'wē-lå), a town in Italy, capital of the province of Aquila, 55 miles northeast of Rome, the seat of a bishop, an attractive and interesting town with spacious streets and handsome palaces. It was twice sacked by the French armies in 1799. Population 18,494. The province has an area of 2509 sq. miles, a population of 397,645.

Aquila, a native of Pontus, flourished about 130 A.D., celebrated for his exceedingly close and accurate translation of the Hebrew Scriptures into Greek.

Aquilaria. See *Aloes-wood.*

Aquilegia, a genus of plants, popularly columbine. The garden plant has a flower resembling five clustered pigeons. Hence the name.

Aquileia (ak-wi-lē'a), an ancient city near the head of the Adriatic Sea, in Upper Italy, built by the Romans in 182 or 181 B.C. Commanding the N. E. entrance into Italy it became important as a commercial center and a military post, and was frequently the base of imperial campaigns. In 452 it was destroyed by Attila. The modern Aquileia or Aglar is a small place of about 2000 inhabitants. It belongs to Austria and is in the crownland of Görz.

Aquinas (a-kwī'nas; *i.e.,* of Aquino), St. Thomas, a celebrated scholastic divine, born about 1227; died in 1274; descended from the counts of Aquino, in the Kingdom of the Two Sicilies. He was educated at the Benedictine monastery of Monte Cassino, and at the University of Naples, where he studied for six years. About the age of seventeen he entered a convent of Dominicans, much against the wishes of his family. He attended the lectures of Albertus Magnus at Cologne, in whose company he visited Paris in 1245 or 1246. Here he became involved in the dispute between the university and the Begging Friars as to the liberty of teaching, advocating the rights claimed by the latter with great energy. In 1257 he received the degree of doctor from the Sorbonne, and began to lecture on theology, rapidly acquiring the highest reputation. In 1263 he was at the Chapter of the Dominicans in London, and in 1268 in Italy, lecturing in Rome, Bologna, and elsewhere. In 1271 he was again in Paris lecturing to the students; in 1272 professor at Naples. He had been offered the archbishopric of Naples and the abbacy of Monte Cassino, but refused the offer. He died on his way to Lyons attend a general council for the purpose of uniting the Greek and Latin Churches. He was called, after the fashion of the times, the *angelic doctor,* and was canonized by John XXII. The most important of his numerous works, which were all written in Latin, is the *Summa Theologiæ,* which, although only professing to treat of theology, is in reality a complete and systematic summary of the knowledge of the time. His disciples were known as *Thomists.*

Aquitania (ak-wi-tā'ni-a), later Aquitaine, a Roman province in Gaul, which comprehended the countries on the coast from the Garonne to the Pyrenees and from the sea to Toulouse. It was brought into connection with England by the marriage of Henry II with Eleanor, daughter of the last Duke of Aquitaine. The title to the province was long disputed by England and France, but it was finally secured by the latter (1453).

Arabah (ä'rä-bä), a deep, rocky valley or depression in northwestern Arabia, between the Dead Sea and Gulf of Akabah, a sort of continuation of the Jordan valley.

Arabesque (ar'a-besk), a species of ornamentation for enriching flat surfaces, often consisting of fanciful figures, human or animal, combined with floral forms. There may be said to be three periods and distinctive varieties of arabesque—(*a*) the Roman or Græco-Roman, introduced into Rome from the East when pure art was declining; (*b*) the Arabesque of the Moors as seen in the Alhambra, introduced by them into Europe in the middle ages; (*c*) Modern

Renaissance Arabesque.

Arabesque, which took its rise in Italy in the Renaissance period of art. The arabesques of the Moors, which perhaps reached their highest expression in the Alhambra, consist essentially of complicated ornamental designs based on the suggestion of plant-growth, combined with extremely complex geometrical forms.

Arabgir (ä-räb-gēr′) or ARABKIR′, a town in Asiatic Turkey 147 miles W. S. W. of Erzerum, noted for its manufactures of silk and cotton goods, Pop. 20,000.

Arabi Pasha (ä-rä′bi pa-shạ′), called by himself *al-Misrī*, 'the Egyptian,' was born in Lower Egypt in 1839 or 1840 of a fellah family. He entered the army as a conscript and was made an officer by Said Pasha in 1862. About 1875 he joined a secret society which had for its object the elimination of Turkish officers in the Egyptian army, but which soon began agitation against Europeans. In 1881 he headed a military revolt, and was for a time virtually dictator of Egypt. Attacked by a British army, and after a short campaign, beginning with the bombardment of Alexandria and ending with the defeat of Arabi and his army at Tell-el-Kebir, he surrendered and was banished to Ceylon. He returned to Egypt, 1901; died Sept., 1911.

Arabia (a-rā′bi-a), a great peninsula in the S.W. of Asia, bounded on the N. roughly by parallel 30° N., on the N. E. by the Persian Gulf and the Gulf of Oman, S. or S. E. by the Indian Ocean, and S. W. by the Red Sea and Gulf of Aden. Its length from N. W. to S. E. is about 1800 miles, its mean breadth about 600 miles, its area rather over 1,000,000 sq. m., its pop. probably not more than 3,500,000. Roughly described, it exhibits a central tableland surrounded by a series of deserts, with numerous scattered oases, while around this is a line of mountains parallel to and approaching the coasts, and with a narrow rim of low grounds (*tehāma*) between them and the sea. In its general features Arabia resembles the Sahara, of which it may be considered a continuation. Like the Sahara, it has its wastes of loose sand, its stretches of bare rocks and stones, its mountains devoid of vegetation, its oases with their wells and streams, their palm-groves and cultivated fields—islands of green amid the surrounding desolation. Rivers proper there are none. By the ancients the whole peninsula was broadly divided into three great sections—Arabia Petræa (containing the city Petra), Deserta (desert), and Felix (happy). The first and last of these answer roughly to the modern divisions of the region of Sinai in the N. W. and Yemen in the S. W. while the name *Deserta* was vaguely given to the rest of the country. The principal divisions at the present are the Sinai Peninsula in the extreme northwest, lying between the Gulf of Suez and the Gulf of Akabah; on the east and extending south is El Hedjaz (Hedjaz the 'Barrier') fronting throughout its length on the Red Sea, comprising the sacred territory of Mecca and Medinah; this is succeeded by the fertile, well-watered and well-cultivated country of El Yemen, likewise on the Red Sea, the littoral from 20° N. to 15° N. being the low-lying sandy strip, covered with coral debris, of El Tehama; Hadramaut and Mahra fronting the Gulf of Aden and the Indian Ocean respectively are on the south; the mountainous kingdom of Oman, forming the horn of Arabia, lies on the Gulf of Oman to the East; El Hasa in the northeast, fronting the Persian Gulf; and El Nejd, the oasis-studded middle portion of the interior. The deserts are the stony Syrian Desert in the north, the Nefud (the Red Sand Desert) below it, and the great arid waste of Roba el Khali to the south. The chief towns are Mecca, the birthplace of Mohammed; Medina, the place to which he fled from Mecca (A.D. 622), and where he is buried; Mocha, a seaport celebrated for its coffee; Aden, on the S. W. coast, a strongly fortified garrison belonging to Britain; Sana, the capital of Yemen; and Muscat, the capital of Oman, a busy port with a safe anchorage. The chief towns of the interior are Haïl, the residence of the emir of Northern Nejd; Oneizah, under the same ruler; and Riad, capital of Southern Nejd. The most flourishing portions of Arabia are in Oman, Hadramaut, and Nejd. In the two former are localities with numerous towns and villages and settled industrious populations like those of Hindustan or Europe.

The climate of Arabia in general is marked by extreme heat and dryness. Aridity and barrenness characterize both high and low grounds, and the date-palm is often the only representative of vegetable existence. There are districts which in the course of the year are hardly refreshed by a single shower of rain. Forests there are few or none. Grassy pastures have their place supplied by steppe-like tracts, which are covered for a short season with aromatic herbs, serving as food for the cattle. The date-palm furnishes the staple article of food; the cereals are wheat, barley, maize, and millet; various sorts of fruit flourish; coffee and many aromatic plants and substances, such as gum-arabic, benzoin, mastic, balsam, aloes, myrrh, frankin-

cense, etc., are produced. There are also cultivated in different parts of the peninsula, according to the soil and climate, beans, rice, lentils, tobacco, melons, saffron, colocynth, poppies, olives, etc. Sheep, goats, oxen, the horse, the camel, ass, and mule supply man's domestic and personal wants. Among wild animals are gazelles, ostriches, the lion, panther, hyena, jackal, etc. Among mineral products are saltpeter, mineral pitch, petroleum, salt, sulphur, and several precious stones, as the carnelian, agate, and onyx.

The Arabs, as a race, are of middle stature, of a powerful though slender build, and have a skin of a more or less brownish color; in towns and the uplands often almost white. Their features are well cut, the nose straight, the forehead high. They are naturally active, intelligent, and courteous; and their character is marked by temperance, bravery, and hospitality. The first religion of the Arabs, various forms of fetishism, was supplanted by the doctrines of Mohammedanism, which succeeded rapidly in establishing itself throughout Arabia. Besides the two principal sects of Islam, the Sunnites and the Shiites, there also exists, in considerable numbers, a third Mohammedan sect, the Wahabis, which arose in the latter half of the eighteenth century, and for a time possessed great political importance in the peninsula. The mode of life of the Arabs is either nomadic or settled. The nomadic tribes are termed Bedouins (or Bedawin), and among them are considered to be the Arabs of the purest blood. Commerce is largely in the hands of foreigners, among whom the Jews and Banians (Indian merchants) are the most numerous.

The history of the Arabs previous to Mohammed is obscure. The earliest inhabitants are believed to have been of the Semitic race. Jews in great numbers migrated into Arabia after the destruction of Jerusalem, and, making numerous proselytes, indirectly favored the introduction of the doctrines of Mohammed. With his advent the Arabians uprose and united for the purpose of extending the new creed; and under the caliphs—the successors of Mohammed—they attained great power, and founded large and powerful kingdoms in three continents. (See *Caliphs.*) On the fall of the caliphate of Bagdad in 1258 the decline set in, and on the expulsion of the Moors from Spain the foreign rule of the Arabs came to an end. In the sixteenth century Turkey subjected Hejaz and Yemen, and received the nominal submission of the tribes inhabiting the rest of Arabia. The subjection of Hejaz was maintained down to the year 1917; but Yemen achieved its practical independence in the 17th century, and maintained it till 1872, when the territory again fell into the hands of the Turks. In 1839 Aden was occupied by the British. Oman early became virtually independent of the caliphs, and grew into a well-organized kingdom. In 1508 its capital, Maskat or Muscat, was occupied by the Portuguese, who were not driven out till 1651. The Wahabis appeared towards the end of the eighteenth century, and took an important part in the political affairs of Arabia, but their progress was interrupted by Mehemet Ali, pasha of Egypt, and they suffered a complete defeat by Ibrahim Pasha. He extended his power over most of the country, but the events of 1840 in Syria compelled him to renounce all claims to Arabia. As a result Hejaz was again subjected to the sway of Turkey, which has since regained its rule over Yemen and subjected El-Hasa. In 1917, during the European war, Hejaz declared its independence.

Arabian Language and Literature.—The Arabic language belongs to the Semitic dialects, among which it is distinguished for its richness, softness, and high degree of development. By the spread of Islam it became the sole written language and the prevailing speech in all Southwestern Asia and Eastern and Northern Africa, and for a time in southern Spain, in Malta, and in Sicily; and it is still used as a learned and sacred language wherever Islam is spread. Almost a third part of the Persian vocabulary consists of Arabic words, and there is the same proportion of Arabic in Turkish. The Arabic language is written in an alphabet of its own, which has also been adopted in writing Persian, Hindustani, Turkish, etc. As in all Semitic languages (except the Ethiopic), it is read from right to left. The vowels are usually omitted in Arabic manuscripts, only the consonants being written.

Poetry among the Arabs had a very early development, and before the time of Mohammed poetical contests were held and prizes awarded for the best pieces. The collection called the *Moallakât* contains seven pre-Mohammedan poems by as many authors. Many other poems belonging to the time before Mohammed, some of equal age with those of the Moallakât, are also preserved in collections. Mohammed gave a new direction to Arab literature. The rules of faith and life which he laid down were collected by Abu-Bekr, first caliph after his death, and published by Othman, the third caliph, and constitute the *Koran* —the Mohammedan Bible. The progress

of the Arabs in literature, the arts and sciences, may be said to have begun with the government of the caliphs of the family of the Abbassides, A.D. 749, at Bagdad, several of whom, as Harun al Rashid and Al Mamun, were munificent patrons of learning; and their example was followed by the Ommiades in Spain. In Spain were established numerous academies and schools, which were visited by students from other European countries; and important works were written on geography, history, philosophy, medicine, physics, mathematics, arithmetic, geometry, and astronomy. Most of the geography in the middle ages is the work of the Arabians, and their historians since the eighth century have been very numerous. The philosophy of the Arabians was of Greek origin, and derived principally from that of Aristotle. Numerous translations of the scientific works of Aristotle and other Greek philosophers were made principally by Christian scholars who resided as physicians at the courts of the caliphs. These were diligently studied in Bagdad, Damascus, and Cordova, and, being translated into Latin, became known in the west of Europe. Of their philosophical authors the most celebrated are Alfarabi (tenth century), Ibn Sina or Avicenna (died A.D. 1037), Alghazzali (died 1111), Ibn Roshd or Averroes (twelfth century), called by preëminence The Commentator, etc. In medicine they excelled all other nations in the middle ages, and they are commonly regarded as the earliest experimenters in chemistry. Their mathematics and astronomy were based on the works of Greek writers, but the former they enriched, simplified, and extended. It was by them that algebra (a name of Arabic origin) was introduced to the western peoples, and the Arabic numerals were similarly introduced. Astronomy they especially cultivated, for which famous schools and observatories were erected at Bagdad and Cordova. The *Almagest* of Ptolemy in an Arabic translation was early a text-book among them. Along with science poetry continued to be cultivated, but after the ninth or tenth centuries it grew more and more artificial. Among poets were Abu Nowas, Asmai, Abu Temmam, Motenabbi, Abul-Ala, Busiri, Abu Firas, and Hariri. Tales and romances in prose and verse were written. The tales of fairies, genii, enchanters, and sorcerers in particular, passed from the Arabians to the western nations, as in *The Thousand and One Nights*. Some of the books most widely read in the middle ages, such as *The Seven Wise Masters and the Fables of Pilpay* or *Bidpai*, found their way into Europe through the instrumentality of the Arabs. At the present day Arabic literature is almost confined to the production of commentaries and scholia, discussions on points of dogma and jurisprudence, and grammatical works on the classical language. There are a few newspapers published in Arabic.

Arabian Architecture. See *Moorish Architecture, Saracenic Architecture.*

Arabian Gulf. See *Red Sea.*

Arabian Nights, or THE THOUSAND AND ONE NIGHTS, a celebrated collection of Eastern tales, long current in the East, and supposed to have been derived by the Arabians from India, through the medium of Persia. They were first introduced into Europe in the beginning of the eighteenth century by means of the French translation of Antoine Galland. Galland's translation is far from accurate, and to remedy this fault E. W. Lane produced, in 1840, a new and correct translation. The story which connects the tales of *The Thousand and One Nights* is as follows:—The Sultan Shahriyar, exasperated by the faithlessness of his bride, made a law that every one of his future wives should be put to death the morning after marriage. At length one of them, Shahrazad, the generous daughter of the grand-vizier, succeeded in abolishing the cruel custom. By the charm of her stories the fair narrator induced the sultan to defer her execution every day till the dawn of another, by breaking off in the middle of an interesting tale which she had begun to relate. In the form we possess them these tales belong to a comparatively late period, though the exact date of their composition is not known. Lane, who published a translation of a number of the tales, with valuable notes, is of opinion that they took their present form some time between 1475 and 1525. Two complete English translations have recently been printed, giving many passages that previous translators had omitted on the score of morality or decency.

Arabian Sea, the part of the Indian Ocean between Arabia and India.

Arabic (ar'a-bik) FIGURES, the characters, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0; of Hindu origin, introduced into Europe by the Moors. They did not come into general use till after the invention of printing.

Arabine (ar'a-bīn), that portion of gum-arabic which is soluble in water. It is known by the name of

mucilage and is used in pharmacy in making cough mixtures and in calico printing to thicken colors and mordants.

Arable (ar'a-bl) LAND, land which is wholly or chiefly cultivated by the plow, as distinguished from grass-land, woodland, common pasture, and waste.

Aracacha, or ARRACACHA (ar-a-kä'-cha), a genus of umbelliferous plants of Southern and Central America. The root of *A. arracacha* is divided into several lobes, each of which is about the size of a large carrot. These are boiled like potatoes and largely eaten in South America.

Aracan, or ARAKAN (ar-a-kan'), the most northern division of Lower Burmah, on the Bay of Bengal; area, 18,540 sq. miles; pop. 762,102 Ceded to the English in 1826, as a result of the first Burmese war.

Aracari (á-rá-sä'rē), native name of a genus of brilliant birds (*Pteroglossus*) closely allied to the toucans, but generally smaller; natives of the warm parts of S. America.

Aracati (á-rá-ká-tē'), a Brazilian river-port, prov. of Ceará, on the river Jaguaribe, about 10 miles from its mouth. Exports hides and cotton. Pop. about 12,000.

Araceæ (a-rā'ce-ē), a natural order of monocotyledonous plants, mostly tropical, having the genus *Arum* as the type. Most of the species have tuberous roots abounding in starch, which forms a wholesome food after the acrid (and even poisonous) juice has been washed out. See *Arum*, *Caladium*, *Dumbcane.*

Arachis (ar'a-kis), a genus of leguminous plants much cultivated in warm climates, and esteemed a valuable article of food. The most remarkable feature of the genus is that when the flower falls the stalk supporting the small, undeveloped fruit lengthens, and bending towards the ground pushes the fruit into the ground, when it begins to enlarge and ripen. The pod of *A. hypogæa* (popularly called ground, earth, or pea-nut) is of a pale yellow color, and contains two seeds the size of a hazel-nut, in flavor sweet as almonds, and yielding when pressed an excellent oil.

Arachnida (a-rak'ni-da; Greek, *arachnē*, a spider), a class of Arthropoda or higher Annulose animals, including the Spiders, Scorpions, Mites, Ticks, etc. They have the body divided into a number of segments or *somites*, some of which have always articulated appendages (limbs, etc.). There is often a pair of nervous ganglia in each somite, although in some forms (as spiders) the nervous system becomes modified and concentrated. They are oviparous and somewhat resemble insects, but they have a united head and thorax, and do not undergo a metamorphosis similar to insects. They respire by tracheæ, or by pulmonary sacs, or by the skin.

Arack, ARRACK (ar'ak), a spirituous liquor manufactured in the East Indies from a great variety of substances. It is often distilled from fermented rice, or it may be distilled from the juice of the cocoanut and other palms. Pure arrack is clear and transparent, with a yellowish or straw color, and a peculiar but agreeable taste and smell; it contains at least 52 to 54 per cent. of alcohol.

Arad (o'rod), a town of Hungary, on the Maros, 30 miles north of Temeswar, divided by the river into O (Old) Arad and Uj (New) Arad, connected by a bridge; it has a fortress, and is an important railway center, with a large trade and manufactures. Pop. 70,000.

Aradus (ar'a-dus; now *Ruad*), an islet about a mile in circumference lying 2 miles off the Syrian coast, 35 miles N. of Tripoli; the site of the Phœnician stronghold Arvad, a city second only to Tyre and Sidon; now occupied by about 3000 people, mainly fishermen.

Ar'af, the purgatory of Islam, the place between heaven and hell. Its position is not strictly defined, but it is undoubtedly a place of purification by fire.

Arafat (ar-a-fat'), or JEBEL ER RAHMEH ('Mountain of Mercy'), a hill in Arabia, about 200 feet high, with stone steps reaching to the summit, 15 miles southeast of Mecca; one of the principal objects of pilgrimage among Mohammedans, who say that it was the place where Adam first received his wife Eve after they had been expelled from Paradise and separated from each other 120 years. A sermon delivered on the mount constitutes the main ceremony of the Hadj or pilgrimage to Mecca, and entitles the hearer to the name and privileges of a Hadji or pilgrim.

Arago (är'a-gō' or är-ä-gō'), DOMINIQUE FRANÇOIS, a French physicist, born in 1786; died at Paris in 1853. After studying in the Polytechnic School at Paris, he was appointed a secretary of the Bureau des Longitudes. In 1806 he was associated with Biot in completing in Spain the measurements of Delambro and Mechain to obtain an arc

of the meridian. Before he got back to France he had been shipwrecked and narrowly escaped being enslaved at Algiers. In 1809 he was elected to the Academy of Sciences, and appointed a professor of the Polytechnic School. He distinguished himself by his researches in the polarization of light, galvanism, magnetism, astronomy, etc. His discovery of the magnetic properties of substances devoid of iron, made known to the Academy of Sciences in 1824, procured him the Copley medal of the Royal Society of London in 1825. A further consideration of the same subject led to the equally remarkable discovery of the production of magnetism by electricity. He took part in the revolution of 1848, and held the office of minister of war and marine in the provisional government. At the *coup d'état* of Dec., 1852, he refused to take the oath to the government of Louis Napoleon, but the oath was not pressed. His works, which were posthumously collected and published, consist, besides his *Astronomie Populaire*, chiefly of contributions to learned societies and biographical notices (*éloges*) of deceased members of the Academy of Sciences.

Arago, EMMANUEL, son of Dominique François, French advocate and politician, was born at Paris in 1812; called to the bar 1837; took part in the revolution of 1848; renounced politics after the *coup d'état* of Dec., 1852, but continued to practise at the bar. After the fall of the empire he again took a prominent part in public affairs, and held several important offices. He is author of a volume of poems and many theatrical pieces. Died 1896.

Arago, ETIENNE, brother of Dominique Arago, was born in 1802. He founded the journals *La Réforme* and *Le Figaro;* was director of the Théâtre du Vaudeville, 1829; took part in the revolution of 1848; was condemned to transportation, 1849; fled from France, but returned in 1859; was mayor of Paris during the German war, and appointed archivist to the Ecole des Beaux Arts, 1878. He is author of upwards of 100 dramas; *La Vie de Molière; Les Bleus et les Blancs*, and other works. He died March 6, 1892.

Aragon (ar'a-gon), KINGDOM OF, a former province or kingdom of Spain, now divided into the three provinces of Teruel, Huesca, and Saragossa; bounded on the N. by the Pyrenees, N. W. by Navarre, W. by Castile, S. by Valencia, and E. by Catalonia; length about 190 miles, average breadth 90 miles; area, 18,294 sq. miles. It was governed by its own monarchs until the union with Castile on the marriage of Ferdinand and Isabella (1479). Pop. 912,711.

Aragona (ä-rà-gō'nà), a town in Sicily, 8 miles N. N. E. of Girgenti. Pop. 11,985. In the neighborhood is the mud volcano of Macculuba.

Araguaya (à-rà-gwī'à), a Brazilian river, principal affluent of the Tocantins; rises about the 18th degree of S. lat.; in its course northwards forms the boundary between the provinces of Matto Grosso and Goyaz, and falls into the Tocantins near lat. 6° S.; length, about 1300 miles, of which over one-half is navigable.

Aral, a salt-water lake in Asia, in Russian territory, about 150 miles W. of the Caspian Sea, between 43° 42′ and 46° 44′ N. lat., and 58° 18′ and 61° 46′ E. lon.; length 270 miles, breadth 165; area, 26,233 sq. miles (or not much smaller than Scotland). It stands 240 feet above the level of the Caspian, and 160 feet above the Mediterranean. It receives the Amoo Daria or Oxus and the Sir Daria or Jaxartes, and contains a multitude of sturgeon and other fish. It is encircled by rocky and sandy tracts, and its shores are without harbors. It has no outlet. The Aral contains a large number of small islands; steamers have been placed on it by the Russians.

Aralia (a-rā'li-a), a genus of plants with small flowers arranged in umbels, and succulent berries, the type of the nat. order *Araliaceæ*, which is nearly related to the *Umbelliferæ*, but the species are of more shrubby habit. They are natives chiefly of tropical or subtropical countries, and in Britain are represented by the ivy; ginseng belongs to the order. From the pith of *Tetrapanax papyrifer* is obtained the so-called Chinese rice-paper.

Aram, EUGENE, a self-taught scholar whose unhappy fate has been made the subject of a ballad by Hood and a romance by Lord Lytton, was born in Yorkshire, 1704, executed for murder, 1759. In 1734 he set up a school at Knaresborough. About 1745 a resident of that place, named Daniel Clarke, was suddenly missing under suspicious circumstances; and no light was thrown on the matter till full thirteen years afterwards, when an expression dropped by one Richard Houseman respecting the discovery of a skeleton supposed to be Clarke's, caused him to be taken into custody. From his confession an order was issued for the apprehension of Aram, who had long quitted Yorkshire, and was at the time acting as usher at the grammar-school at Lynn. He was brought to trial on the 3d of August, 1759, at York,

where, notwithstanding an able and eloquent defense which he made before the court, he was convicted of the murder of Clarke, and sentenced to death. He was among the first to recognize the affinity of the Celtic to the other European languages, and under favorable circumstances might have done some valuable work in philological research.

Aramaic (ar-a-mā'ic) or ARAMEAN, a Semitic language nearly allied to the Hebrew and Phœnician, anciently spoken in Syria and Palestine and eastwards to the Euphrates and Tigris, being the official language of this region under the Persian domination. In Palestine it supplanted Hebrew, and it was it and not the latter that was the tongue of the Jews in the time of Christ. Parts of Daniel and Ezra are written in Aramaic, or, as this form of it is often incorrectly named, Chaldee, from an old notion that the Jews brought from Babylon. An important Aramaic dialect is the Syriac, in which there is an extensive Christian literature. See *Chaldee, Syriac.*

Araneidæ (a-ra-nē'i-dē), the spider family.

Aran Islands, or SOUTH ISLANDS OF ARAN, three islands at the mouth of Galway Bay, off the W. coast of Ireland. They are remarkable for a number of architectural remains of a very early date. The inhabitants are chiefly engaged in agriculture and fishing. The North Island of Aran lies off the coast of Donegal.

Aranjuez (å-rån-*h*u-eth'), a small town and palace in Spain, 30 miles from Madrid, with splendid gardens laid out by Philip II. The court used to reside here from Easter till the close of June, and here occurred the outbreak of the revolution, 1808. Pop. 12,670.

Arany (o-ron'y), JANOS, Hungarian poet, born 1819, died 1882. He was for some time a strolling player, but became professor of Latin at the Normal School of Szalonta, professor of Hungarian literature at Nagy Körös, and secretary of the Hungarian Academy. Author of *The Lost Constitution: Katalin;* and a series of three connected narrative poems on the fortunes of Toldi, the Samson of Hungarian folk-lore; etc.

Arapahoes (a-rap'a-hōs), a tribe of American Indians located near the headwaters of the Arkansas and Platte rivers, not now of any importance.

Arapaima (a-ra-pī'ma), a genus of South American freshwater fishes, order Physostomi, family Osteoglossidæ, one species of which (*A. gigas*) grows to the length of 15 or 16 feet, and forms a valuable article of food in Brazil and Guiana. It is covered with large bony scales, and has a bare and bony head.

Ararat (ar'a-rat), a celebrated mountain in Armenia, forming the point of contact of Russia with Turkey and Persia; an isolated volcanic mass showing two separate cones known as the Great and Little Ararat, resting on a common base and separated by a deep intervening depression. The elevations are: Great Ararat, 16,916 feet; Little Ararat, 12,840 feet; the connecting ridge, 8,780 feet. Vegetation extends to 14,200 feet, which marks the snow-line. According to tradition, Mount Ararat was the resting-place of the ark when the waters of the flood abated.

Araroba, ARRAROBA (a-ra-rō'ba), the powdered bark of *Andira araroba.* See *Andira.*

A'ras (the ancient *Araxes*), a river of Armenia, rising S. of Erzerum at the foot of the Bingol-dagh; it flows for some miles through Turkish territory northeast to the new Russian frontier. Here it turns eastwards to the Erivan plain N. of Ararat, whence it sweeps in a semicircle mostly between the Russian and Persian territories round to its confluence with the Kur, 60 miles from its mouth in the Caspian; length, 500 miles.

Aratus (a-rā'tus), a Greek poet, born at Soli in Cilicia; flourished about 270 B.C. Wrote *Phœnomēna,* his most famous poem, and *Diosemeia* (on weather signs), which was translated by Cicero and Cæsar Germanicus, and imitated by Virgil in the Georgics. He is quoted by St. Paul in Acts, xvii: 28.

Ara'tus, OF SICYON, a statesman of ancient Greece, born 272 B.C. In 251 B.C. he overthrew the tyrant of Sicyon and joined it to the Achæan League, which he greatly extended. He accepted the aid of Antigonus Doson, King of Macedon, against the Spartans, and became in time little more than the adviser of the Macedonian king, who had now made the League dependent on himself. He is said to have been poisoned by Philip V of Macedon, 213 B.C.

Araucanians (ar-aw-kā'ni-ans), a South American native race in the southern part of Chile, occupying a territory stretching from about 37° to 40° of S. lat. They are warlike and more civilized than many of the native races of S. America, and maintained almost unceasing war with the Spaniards from 1537 to 1773, when their independence was recognized by Spain, though their territory was much curtailed.

Their early contests with the Spaniards were celebrated in Ercilla's Spanish poem *Araucana*. With the republic of Chile they were long at feud, and latterly had at their head a French adventurer named Tounens, who claimed the title of king. In 1870 after prolonged resistance they finally submitted to Chile. The Chilean province of Arauco receives its name from them.

Araucaria (ar-aw-kā'ri-a), a genus of trees of the coniferous or pine order, belonging to the southern hemisphere. The species are large evergreen trees with rather large, stiff, flattened, and generally imbricated leaves, verticillate spreading branches, and bearing large cones, each scale having a single large seed. One of the best known species is *A. imbricāta* (the Chile pine or monkey-puzzle), which is quite hardy. It is a native of the mountains of southern Chile, where it forms vast forests and yields a hard, durable wood. Its seeds are eaten when roasted. The Moreton Bay pine of N. S. Wales (*A. Cunninghamii*) supplies a valuable timber used in house and boat building, in making furniture, and in other carpenter work. A species, *A. excelsa*, or Norfolk Island pine, abounds in several of the South Sea Islands, where it attains a height of 220 feet with a circumference of 30 feet, and is described as one of the most beautiful of trees. Its foliage is light and graceful, and quite unlike that of *A. imbricāta*, having nothing of its stiff formality. Its timber is of some value, being white, tough, and close-grained.

Arauco (a-ra'kō), a province of Chile, named from the Araucanian Indians; area, 2458 sq. miles; capital Lebu. Pop. 70,635.

Aravulli Hills (a-ra-vul'le), a range of Indian mountains running N. E. and S. W. across the Rajputāna country, which they separate into two natural divisions—desert plains on the N. W. and fertile lands on the S. E.; highest point, Mount Abu (5653 feet).

Arawak (ăr'a-wak), a tribe of Indians in Dutch Guiana, the name signifying 'meal eaters,' since their principal food is cassava bread. The name has been given to the great Arawakan linguistic stock, extending from southern Brazil and Bolivia to the northernmost part of the continent. It also spread over the West Indies, but was driven out by the irruption of the Caribs.

Araxes (a-raks'es). See *Aras*.

Arbaces (ar-bā'sēs), one of the generals of Sardanapālus, king of Assyria. He revolted and defeated his master, and became the founder of the Median Empire in 846 B.C.

Arbalist (ar'ba-list), a crossbow.

Arbela (ar-bē'la; now *Erbil*), a place in the Turkish vilayet of Mosul, giving name to the decisive battle fought by Alexander the Great against Darius, at Gaugamela, about 20 miles distant from it, B.C. 331.

Arbitrage (ăr'bi-trâzh), the same as *arbitration of exchanges*. See next article. *Arbitrageur* (ăr'bi-trăzheur) is one who makes calculations of currency exchanges.

Arbitration (ar'bi-trā'shun), is the hearing and determination of a cause between parties in controversy, by a person or persons chosen by the parties. This may be done by one person, but it is common to choose more than one. Frequently two are nominated, one by each party, with a third, the *umpire* (or, in Scotland, sometimes the *oversman*), who is called on to decide in case of the primary arbitrators differing. In such a case the umpire may be agreed upon either by the parties themselves or by the arbitrators, when they have received authority from the parties to the dispute to settle this point. The determination of arbitrators is called an *award*. It has the effect of a judgment, subject to appeal, which may be entered at any time within twenty days from the filing of such award. Arbitration in international affairs has many advocates for its adoption as a substitute for war, but so far questions of only secondary importance have been thus determined. The case of the privateer General Armstrong, in which the first Napoleon acted as arbitrator, was one of the first arbitration cases in American history. The Alabama claims, and more recently the Behring sea fisheries dispute, were settled in this way, and also the controversy between Britain and Venezuela in 1899.

Since this date a number of important questions have been submitted to and settled by The Hague Court of Arbitration (see the following article). One of the most important of these was the fishery dispute between the United States and Great Britain, settled amicably in 1910 after it had remained open for a century. In 1908 was instituted a *Central American Court of Justice* to deal with disputes between the States of that chronically disputatious country. Two such cases have been settled by this court, which promises to become of much utility.

Arbitration, International, the Permanent Court of.

In 1898, at the request of Nicholas II, Emperor of Russia, a conference of representatives of the leading nations was held at The Hague, the capital of the Netherlands, for the purpose of taking steps in favor of maintaining general peace and reducing the armaments of the nations. Though it failed to produce the results hoped for, it led to the formation of a permanent court of international arbitration, before which several international disputes have since been amicably settled. At the suggestion of President Roosevelt a second Peace Congress was held at The Hague in 1907, at which 46 of the nations were represented. The principal achievement was the formation of an International Peace Court. The American delegates sought to bring about a system of obligatory arbitration and the establishment of a Permanent Court of Arbitral Justice. This court was established in principle, a large majority of the delegates favoring a permanent court of this character, but problems arose in the discussion which led to the subject being postponed until the next congress should meet at The Hague. The idea was to have an international court, with seventeen judges selected from the great jurists of the world, to sit at The Hague, meeting once or twice yearly, and ready to act without charge on any dispute between nations that might be brought before it. It would differ from the existing Court of Arbitration in the fact that the latter is called into session only when some case of importance is submitted to it for decision. Germany led the opposition to obligatory arbitration and succeeded in defeating it for the time, but the idea was reopened by President Taft in 1911, when he proposed a treaty with Great Britain in which all disputes between these nations, even those concerning questions of vital interest and national honor, should be arbitrated, where they could not be settled by diplomacy without resorting to arbitration. A number of arbitration treaties were negotiated between the United States and Great Britain, Spain, and other powers. The League of Nations (q. v.), established 1919, provided for a Permanent Court which should be competent to hear and determine any dispute of an international character.

Arbor Day, a day designated by legislative enactment, in the different States, for the voluntary planting of trees by the people; the pupils in the public schools now take part in the observance of the day. It was inaugurated in 1872 by the Nebraska State Board of Agriculture.

Arboretum (ar-bō-rē'tum; Lat. *arbor*, a tree), a place in which a collection of different trees and shrubs is cultivated for scientific or educational purposes.

Arboriculture (ar'bor-i-kul-tūr) includes the culture of trees and shrubs, as well as all that pertains to the preparation of the soil, the sowing of the seeds, and the treatment of the plants in their young state, the preparation of the land previous to their final transplantation, their just adaptation to soil and situation, their relative growth and progress to maturity, their management during growth, and the proper season and period for felling them.

Arbor vitæ (vī'tē; lit. 'tree of life'), the name of several coniferous trees of the genus *Thuja*, allied to the cypress, with flattened branchlets, and small imbricated or scale-like leaves. The common Arbor Vitæ (*Thuja occidentālis*) is a native of North America, where it grows to the height of 40 or 50 feet. The young twigs have an agreeable balsamic smell. The Chinese Arbor Vitæ (*Thuja orientālis*), common in Britain, yields a resin which was formerly thought to have medicinal virtues.

Arbroath (ar-brōth'), or ABERBROTHOCK, an ancient industrial borough and seaport in the county of Forfar, Scotland, at the mouth of the small river Brothock. Its ancient abbey, founded by William the Lion in 1178, and dedicated to Saint Thomas à Becket, is now nothing but a picturesque ruin. There are numerous flax and hemp spinning-mills and factories, and much canvas and linen is made; also tanning, shoemaking, and fishing, and a small shipping trade, but the harbor is bad. Pop. 22,372.

Arbuthnot (ar'buth-not), JOHN, an eminent physician and distinguished wit, born at Arbuthnot, Kincardineshire, Scotland, 1667; died 1735. He received the degree of Doctor of Medicine at the University of St. Andrews; and went to London, where he soon distinguished himself by his writings and by his skill in his profession. In 1704 he was chosen fellow of the Royal Society, and soon after he was appointed physician to Queen Anne. About this time he became intimate with Swift, Pope, Gay, and other wits of the day. His writings, other than professional or scientific, include his contributions (in conjunction with Swift and Pope) to the *Memoirs of Martinus Scriblerus*, *History of John Bull*, *Art of Political Lying*, etc. He was conspicuous not only for learning and wit, but also for worth and humanity.

Arbutus (ar'bū-tus), a genus of plants belonging to the Ericaceæ, or heath order, and comprising a number of small trees and shrubs, natives chiefly of Europe and N. America. *Arbŭtus Unĕdo* abounds near the lakes of Killarney, where its fine foliage adds charms to the scenery. The bright red or yellow berries, somewhat like the strawberry, have an unpleasant taste and narcotic properties. A kind of liquor is made from them. The trailing arbutus (ar-bū'tus) or mayflower of N. America, a plant with fragrant and beautiful blossoms, is *Epigœa repens*, of the same natural order.

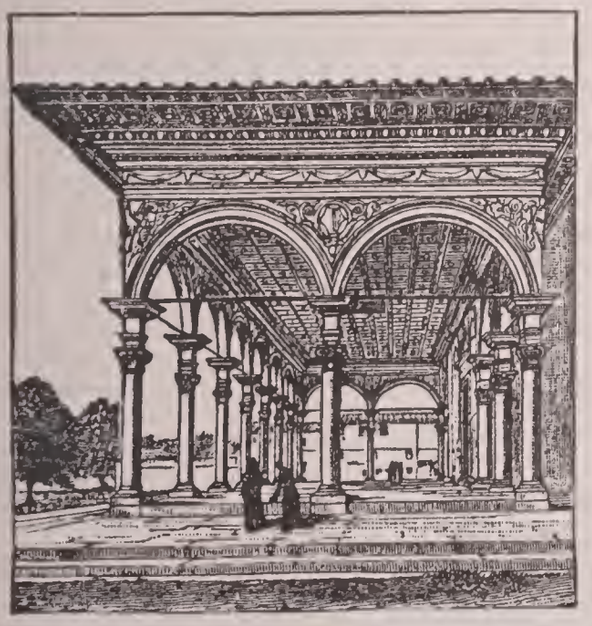
Arc, a portion of a curved line, especially of a circle. It is by means of circular arcs that all angles are measured. —*Electric* or *Voltaic arc*, the luminous arch of intense brightness and excessively high temperature which is formed by an electric current in crossing over the interval of space between the carbon points of an electric lamp. See *Arc-light*.

Arc, Jeanne d'. See *Joan of Arc*.

Arca (ar'ka), a genus of bivalve molluscs, family *Arcidæ*, whose shells are known as *ark-shells*.

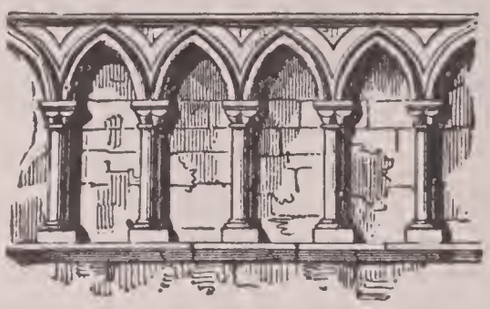
Arcachon (ar-ka-shōn), a town of S. W. France, dep. Gironde, on the almost landlocked basin of Arcachon, a much-frequented bathing-place, with great oyster-rearing establishments. The town stretches along the shore, and is sheltered by sand-hills and pine-woods. It is connected by railway with Bordeaux. Pop. (1906) 9006.

Arcade (är-kād'), a series of arches supported on piers and pillars,



Arcade—Portico of S. Maria delle Grazie, near Arezzo.

used generally as a screen and support of a roof, or of the wall of a building, and having beneath the covered part an ambulatory, as around a cloister, or a foot-path with shops or dwellings, as frequently seen in old Italian



Arcade—Romsey Church, Hampshire.

towns. Sometimes a porch or other prominent part of an important building is treated with arcades, as in the illustration. At the present day Bologna, Padua, and Berne have fine examples of mediæval arcaded streets, and among more modern work various streets in Turin and the Rue de Rivoli, Paris, are lined with arcades, with shops underneath. In mediæval architecture the term arcade is also applied to a series of arches supported on pillars forming an ornamental dressing or enrichment of a wall, a mode of treatment of very frequent occurrence in the towers, apses, and other parts of churches. In modern use the name arcade is often applied to a passage or narrow street containing shops arched over and covered with glass, as for example the Burlington Arcade, London, and the Galleria Vittorio Emmanuele in Milan.

Arcadia (är-kā'di-a), the central and most mountainous portion of the Peloponnesus (Morea), the inhabitants of which in ancient times were celebrated for simplicity of character and manners. Their occupation was almost entirely pastoral, and thus the country came to be regarded as typical of rural simplicity and happiness. At the present day Arcadia forms a nomarchy of the Kingdom of Greece. Area, 2,028 sq. miles; pop. 167,092.

Arca'dius, born in 377, died 408; son of the Emperor Theodosius, on whose death, in 395 the empire was divided, he obtaining the East, and his brother Honorius the West. He proved a feeble and pusillanimous prince.

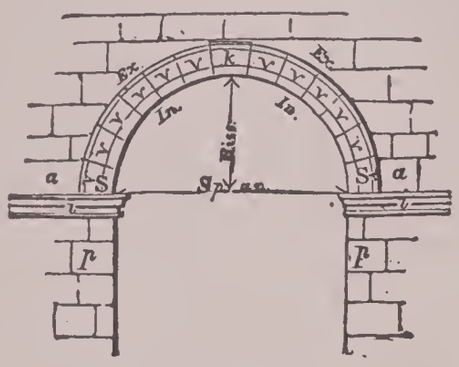
Arcanum (är-kā'num), a word used in the mediæval period to indicate the most valued preparations of alchemy. The 'Great Arcanum' was applied to the highest problems of the science, such as the discovery of the 'grand elixir' and other deep secrets of nature.

Arcesilaus (ar-ses-i-lā'us), a Greek philosopher, the founder

of the second or middle academy, was born about 315 B.C., died 239 B.C. He left no writings, and of his opinions so little is known that it has been doubted whether he was a strict Platonist or a skeptic.

Arch, JOSEPH, labor reformer, born in Warwickshire, England, in 1826. Began life as a hedger; by hard study made himself a preacher of the Primitive Methodists; started a movement for the betterment of farm laborers; founded and became president of their National Union. Was elected to Parliament as a Liberal in 1885, and again in 1892 and 1895–1900.

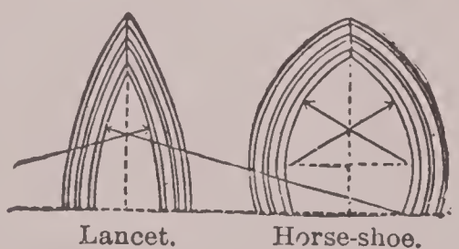
Arch, a structure composed of separate pieces, such as stones or bricks, having the shape of truncated wedges, arranged on a curved line, so as to retain



Parts of an Arch.

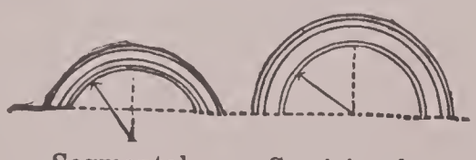
a, Abutments. *i*, Impost. *p*, Piers.
v, Voussoirs or arch-stones. *k*, Keystone.
S, Springers. *In.* Intrados. *Ex.* Extrados.

their position by mutual pressure. The separate stones which compose the curve of an arch are called *voussoirs* or *arch-*



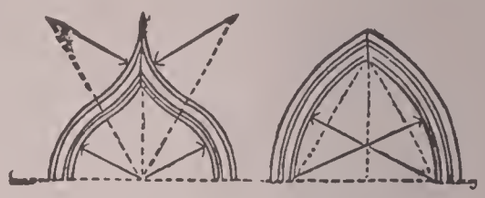
Lancet. Horse-shoe.

stones; the extreme or lowest voussoirs are termed *springers*, and the uppermost or central one is called the *keystone*. The



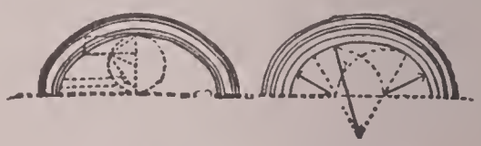
Segmental. Semicircular.

under or concave side of the voussoirs is called the *intrados*, and the upper or convex side the *extrados* of the arch. The supports which afford resting and resisting points to the arch are called *piers* and *abutments*. The upper part of the pier or abutment where the arch rests—technically where it *springs from*—is the



Ogee. Equilateral.

impost. The *span* of an arch is in circular arches the length of its chord, and generally the width between the points of its opposite imposts whence it springs. The *rise* of an arch is the height of the highest point of its intrados above the line of the imposts; this point is sometimes called the *under side of the crown*, the highest point of the extrados



Cycloidal. Elliptical.

being the *crown*. Arches are designated in various ways, as from their shape (circular, elliptic, etc.), or from the resemblance of the whole contour of the curve to some familiar object (lancet arch, horse-shoe arch), or from the method used in describing the curve, as equilateral, three-centered, four-centered, ogee, and

Types of Arches.

Radiating arch. Horizontal arch.

the like; or from the style of architecture to which they belong, as Roman, pointed, and Saracenic arches.—*Triumphal arch*, originally a simple decorated arch under which a victorious Roman general and army passed in triumph. At a later period the triumphal arch was a richly sculptured, massive, and permanent structure, having an archway passing through it, with generally a smaller arch on either side. The name is sometimes given to an arch, generally of wood decorated with flowers or evergreens, erected on occasion of some public rejoicing, etc.

Archæan (är-kē'an) ROCKS (Gr. *archaios*, ancient), the oldest rocks of the earth's crust, crystalline in character, and embracing granite,

syenite, gneiss, mica-schist, etc., all devoid of fossil remains. These rocks underlie and are distinctly separate from the stratified and fossiliferous formations, which indeed have chiefly taken origin from them.

Archæology (är-kē-ol'o-gi; Gr. *archaios*, ancient, and *logos*, a discourse), the science which takes cognizance of the history of nations and peoples as evinced by the remains, architectural, implemental, or otherwise, which belong to the earlier epoch of their existence. In a more extended sense the term embraces every branch of knowledge which bears on the origin, religion, laws, language, science, arts, and literature of ancient peoples. It is to a great extent synonymous with *prehistoric annals*, as a large if not the principal part of its field of study extends over those periods in the history of the human race in regard to which we possess almost no information derivable from written records. Archæology divides the primeval period of the human race, more especially as exhibited by remains found in Europe, into the *stone*, the *bronze*, and the *iron* age, these names being given in accordance with the materials employed for weapons, implements, etc., during the particular period. The *stone* age has been subdivided into the *palæolithic* and *neolithic*, the former being that older period in which the stone implements were not polished as they were in the latter and more recent period. The *bronze* age, which admits of a similar subdivision, is that in which implements were of copper or bronze. In this age the dead were burned and their ashes deposited in urns or stone chests, covered with conical mounds of earth or cairns of stones. Gold and amber ornaments appear in this age. The *iron* age is that in which implements, etc., of iron begin to appear, although stone and bronze implements are found along with them. The word *age* in this sense (as explained under *Age*) simply denotes the stage at which a people has arrived. The phrase stone age, therefore, merely marks the period before the use of bronze, the bronze age that before the employment of iron, among any specific people.

Archæopteryx (är-kē-op'te-riks), a unique fossil bird from the oölitic limestone of Solenhofen, of the size of a rook, and differing from all known birds in having two free claws representing the thumb and forefinger projecting from the wing, and about twenty tail vertebræ free and prolonged as in mammals.

Archangel (ärk-ān'jel; Gr. prefix, *arch*, denoting chief), an angel of superior or of the highest rank. The word archangel occurs in two passages in the Bible, I Thes. iv: 16 and Jude 9. The four archangels are Michael, Gabriel, Uriel and Raphael.

Archangel (ärk-ān'jel), a seaport, capital of the Russian government of the same name, on the right bank of the northern Dwina, about 20 miles above its mouth in the White Sea. Below the town the river divides into several branches. There is a cathedral, hospital museum, etc. The houses are mostly of wood; the place has some manufactures and an important trade, exporting wheat, linseed, flax, tallow, timber, etc. In August, 1918, toward the end of the Great War (1914-18), it was occupied by Allied and American forces. The town was founded in 1584. The port is closed for 6 months by ice. Pop. 45,000. The province has an area of 326,063 sq. miles; pop. 505,700.

Archbald (ärch'bald), a borough of Lackawanna Co., Pennsylvania, 10 miles N. E. of Scranton, in a coal-mining region. It has coal breakers and silk mills. Pop. (1920) 8603.

Archbishop (ärch-bish'op), a chief bishop or bishop over other bishops; a metropolitan prelate. The establishment of this dignity is to be traced up to an early period of Christianity, when the bishops and inferior clergy met in the capitals to deliberate on spiritual affairs, and the bishop of the city where the meeting was held presided. In England there are two (Protestant) archbishops—those of Canterbury and York; the former styled *Primate of all England*, the latter *Primate of England*. The Archbishop of Canterbury is the first peer of the realm, having precedence before all great officers of the crown and all dukes not of royal birth. He crowns the sovereign, and when he is invested with his archbishopric he is said to be enthroned. He can grant special licenses to marry at any time or place, and can confer all the degrees that may be obtained from the universities. He is addressed by the titles of *your grace* and *most reverend father in God*, and writes himself *by divine providence*, while the bishop only writes *by divine permission*. The first Archbishop of Canterbury was Augustine, appointed A.D. 598 by Ethelbert. Next in dignity is the Archbishop of York, between whom and the Archbishop of Canterbury the Lord High-chancellor of England has his place in precedency. The incomes of these two prelates are $75,000 and $50,000, respectively. Scotland had two archbishops—those of St. Andrews and Glasgow. Ireland had four—Dublin,

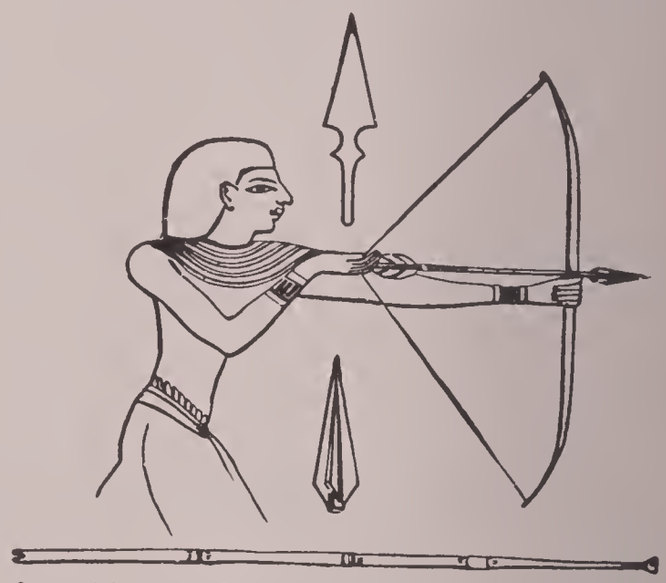
Armagh, Tuam, and Cashel. In the United States there are fourteen (Roman Catholic) archdioceses.

Archdeacon (ärch-dē'kon), in England, an ecclesiastical dignitary next in rank below a bishop, who has jurisdiction either over a part of or over the whole diocese. He is usually appointed by the bishop, under whom he performs various duties, and he holds a court which decides cases subject to an appeal to the bishop.

Archduke (ärch-duke'), a prince belonging to the reigning family of Austria.

Archelaus (är-kē-lā'us), the name of several personages in ancient history, one of whom was the son of Herod the Great. He received from Augustus the sovereignty of Judea, Samaria, and Idumea. The people, tired of his tyrannical and bloody reign, accused him before Augustus, who banished him to Gaul.

Assyrian Archer.



Egyptian Archer with arrow-heads and stone-tipped reed arrow.

Archer-fish, a name given to the *Toxŏtes jaculātor*, an acanthopterygian fish, family *Toxotidæ*, inhabiting the East Indian and Polynesian seas, which has the faculty of shooting drops of water to the distance of 3 or 4 feet at insects, thereby causing them to fall into the water, when it seizes and devours them. This power has been doubted or denied by several ichthyologists. The genus *Toxotes* is representative of the family. There are several species. Also called darter-fish.

Archery (ärch'e-ri), the art of shooting with a bow and arrow. The use of these weapons in war and the chase dates from the earliest antiquity. Ishmael, we learn from Gen., xxi, 'became an archer.' The Egyptians, Assyrians, Persians, Parthians, excelled in the use of the bow; and while the Greeks and Romans themselves made little use of it, they employed foreign archers as mercenaries. Coming to much more recent times, we find the Swiss famous as archers, but they generally used the arbalist or cross-bow, and were no match for their English rivals, who preferred the long-bow. (See *Bow.*) The English victories of Crécy, Poitiers, and Agincourt, gained against apparently overwhelming odds, may be ascribed to the bowmen. Archery disappeared gradually as firearms came into use, and as an instrument of war or the chase the bow is now confined to the most savage tribes of both hemispheres. But though the bow has long been abandoned among civilized nations as a military weapon, it is still cherished as an instrument of healthful recreation, encouraged by archery clubs or societies, which have been established in many parts of the world. The oldest, and by far the most historically important of the British societies, is the Royal Company of Archers, called also the King's Bodyguard for Scotland, formed originally, it is said, by James I, but constituted in its present form by an act of the privy-council of Scotland in 1676. In recent years a number of clubs have been formed in the United States. Archery has the merit of forming a sport open to women as well as men.

Arches (ärch'es) COURT OF, the chief and most ancient consistory court, belonging to the archbishopric of Canterbury, for the debating of spiritual causes. It is named from the church in London, St. Mary le Bow, or Bow Church (so called from a fine *arched steeple*), where it was formerly held.

Archil, or ORCHIL (ár'kil, orkil), a red, violet, or purple coloring matter obtained from various kinds of lichens, the most important of which are the *Roccella tinctoria* and the *R. fuciformis*, natives of the rocks of the Canary and Cape de Verde islands, Mozambique and Zanzibar, South America, etc., and popularly called dyer's moss. The dye is used for improving the tints of other dyes, as from its want of permanence it cannot be employed alone; but the aniline colors have largely superseded it. Cudbear and litmus are of similar origin.

Archilochus (år-kil'o-kus), OF PAROS, one of the earliest famous lyric poets, the first Greek poet who composed iambic verses according to fixed rules. He flourished about 700 B.C. His iambic poems were renowned for force of style, liveliness of metaphor, and a powerful but bitter spirit of satire. In other lyric poems of a higher character he was also considered as a model. All his works are lost but a few fragments.

Archimandrite (år-ki-man'drīt), in the Greek Church, an abbot or abbot-general, who has the superintendence of many abbots and monasteries.

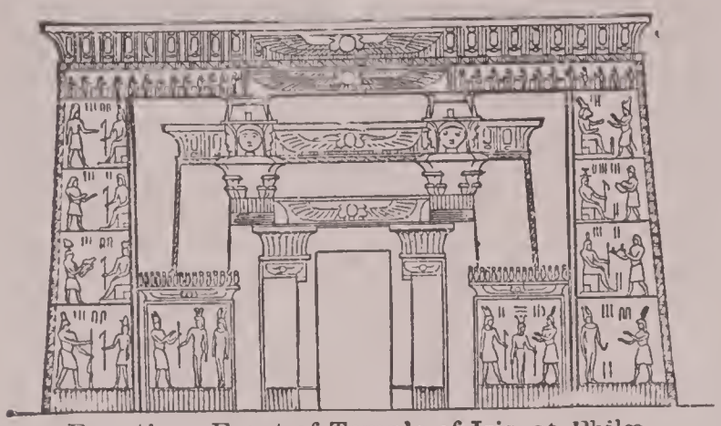
Archimedean (år-ki-mē'de-an) SCREW, a machine for raising water, said to have been invented by Archimedes. It is formed by winding a tube spirally round a cylinder so as to have the form of a screw, or by hollowing out the cylinder itself into a double or triple threaded screw and inclosing it in a water-tight case. When the screw is placed in an inclined position and the lower end immersed in water, by causing the screw to revolve the water may be raised to a limited extent.

Archimedes (år-ki-mē'dēz), a celebrated ancient Greek physicist and geometrician, born at Syracuse, in Sicily, about 287 B.C. He enriched mathematics with discoveries of the highest importance, upon which the moderns have founded their admeasurements of curvilinear surfaces and solids. Archimedes is the only one among the ancients who has left us anything satisfactory on the theory of mechanics and on hydrostatics. He first taught the hydrostatic principle to which his name is attached, 'that a body immersed in a fluid loses as much in weight as the weight of an equal volume of the fluid, and determined by means of it, that an artist had fraudulently added too much alloy to a crown which King Hiero had ordered to be made of pure gold. He discovered the solution of this problem while bathing: and it is said to have caused him so much joy that he hastened home from the bath undressed, and crying out, *Eurēka! Eurēka!* 'I have found it. I have found it!' Practical mechanics also received a great deal of attention from Archimedes, who boasted that if he had a fulcrum or standpoint he could move the world. He is the inventor of the compound pulley, probably of the endless screw, the Archimedean screw, etc. During the siege of Syracuse by the Romans he is said to have constructed many wonderful machines with which he repelled their attacks, and he is stated to have set on fire their fleet by burning-glasses! At the moment when the Romans gained possession of the city by assault (212 B.C.) tradition relates that Archimedes was slain by a soldier while he was sitting in the marketplace contemplating some mathematical figures which he had drawn in the sand.

Archipelago (år-ki-pel'a-gō) a term originally applied to the Ægean, the sea lying between Greece and Asia Minor, then to the numerous islands situated therein, and latterly to any cluster of islands. In the Grecian Archipelago the islands nearest the European coast lie together almost in a circle, and for this reason are called the *Cyclades* (Gr. *kyklos*, a circle); those nearest the Asiatic, being farther from one another, the *Sporades* ('*scattered*'). (See these articles, and *Negropont, Scio, Samos, Rhodes, Cyprus*, etc.) The Malay, Indian, or Eastern Archipelago, on the east of Asia, includes Borneo, Sumatra, and other large islands. See *Malay Archipelago.*

Architecture (år-ki-tect'ūr), in a general sense, is the art of designing and constructing houses, bridges, and other buildings for the purposes of civil life; or, in a more limited but very common sense, that branch of the fine arts which has for its object the production of edifices not only convenient for their special purpose, but characterized by unity, beauty, and often grandeur.—The first habitations of man were such as nature afforded, or cost little labor to the occupant—caves, huts, and tents. But as soon as men rose in civilization and formed settled societies they began to build more commodious and comfortable habitations. They bestowed more care on the materials, preparing bricks of clay or earth, which they at first dried in the air, but afterwards baked by fire; and subsequently they smoothed stones and joined them at first without, and subsequently with, mortar or cement. After they had learned to build houses,

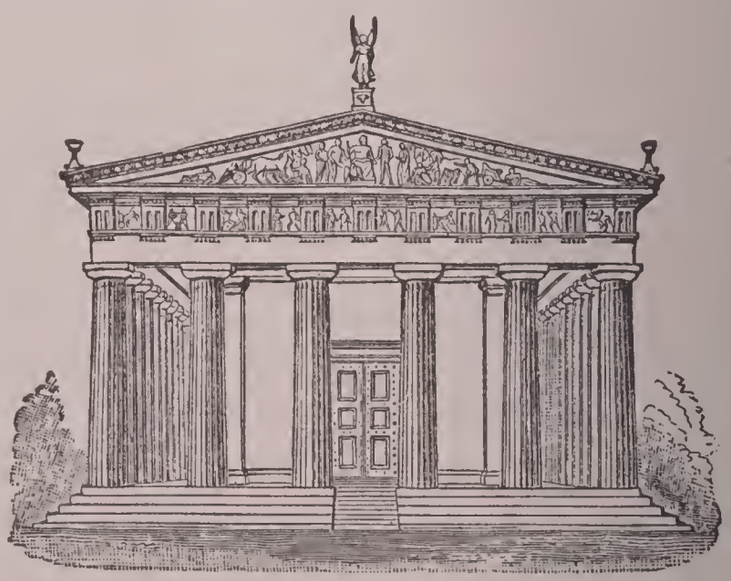
they erected temples for their gods on a larger and more splendid scale than their own dwellings. The Egyptians are the most ancient nation known to us among whom architecture had attained the character of a fine art. Other ancient peoples among whom it made great progress were the Babylonians, whose most celebrated buildings were temples, palaces, and hanging-gardens; the Assyrians, whose capital, Nineveh, was rich in splendid buildings; the Phœnicians, whose cities, Sidon, Tyre, etc., were adorned with equal magnificence; and the Israelites, whose temple was regarded as a wonder of architecture. But comparatively few architectural monuments of these nations have remained till our day.



Egyptian—Front of Temple of Isis, at Philæ.

This is not the case with the architecture of Egypt, however, of which we possess ample remains in the shape of pyramids, temples, sepulchres, obelisks, etc. Egyptian chronology is far from certain, but the greatest of the architectural monuments of the country, the pyramids of Ghizeh, are at least as old as 2800 or 2700 B.C., and may be much older. The Egyptian temples had walls of great thickness and sloping on the outside from bottom to top; the roofs were flat, and composed of blocks of stone reaching from one wall or column to another. The columns were numerous, close, and very stout, generally without bases, and exhibiting great variety in the designs of their capitals. The principle of the arch, though known, was not employed for architectural purposes. Statues of enormous size, sphinxes carved in stone, and on the walls sculptures in outline of deities and animals, with innumerable hieroglyphics, are the decorative objects which belong to this style.

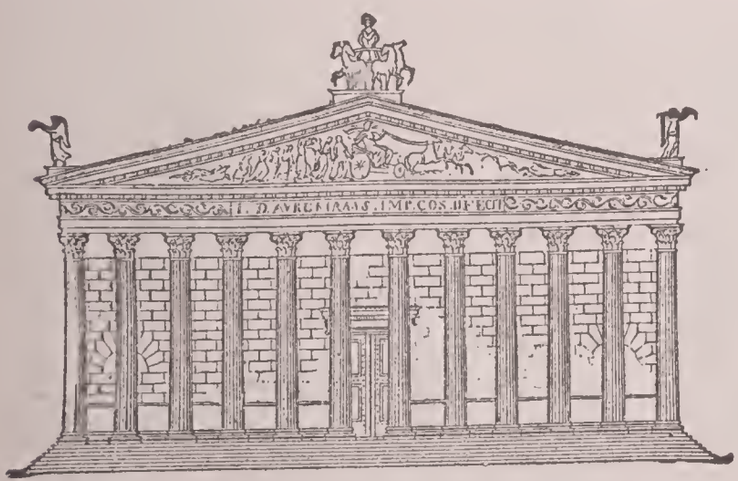
The earliest architectural remains of Greece are of unknown antiquity, and consist of massive walls built of huge blocks of stone. In historic times the Greeks developed an architecture of noble simplicity and dignity. This style is of modern origin as compared with that of Egypt, but the earliest remains give indications that it was in part derived from the Egyptian. It is considered to have attained its greatest perfection in the age of Pericles, or about 460–430 B.C. The great masters of this period were Phidias, Ictinus, Callicrates, etc. All the extant buildings are more or less in ruins. The style is characterized by beauty, harmony, and simplicity in the highest degree. Distinctive of it are what are called the *orders* of architecture, by which term are understood certain modes of proportioning and decorating the column and its superimposed entablature. The Greeks had three orders, called respectively the *Doric*, *Ionic*, and *Corinthian*. (See articles under these names.) Greek buildings were abundantly adorned with sculptures, and painting was extensively used, the details of the structures being enriched by different colors or tints. Lowness of roofs and the absence of arches were distinctive features of Greek architecture, in which, as in that of Egypt, horizontality of line is another characteristic mark. The most remarkable public edifices of the Greeks were temples, of which the most famous is the Parthenon at Athens. Others exist in various parts of Greece as well as in Sicily, Southern Italy, Asia Minor, etc., where important Greek communities were early settled. Their theaters were semicircular on one side and square on the other, the semicircular part being usually



Grecian Doric—Temple of Jupiter, at Olympia.

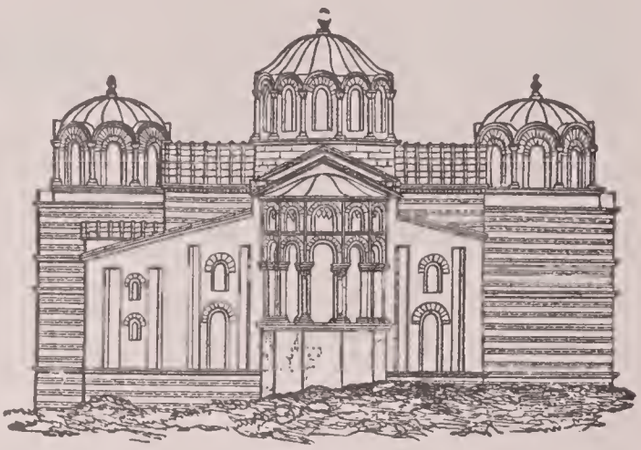
excavated in the side of some convenient hill. This part, the auditorium, was filled with concentric seats, and might be capable of containing 20,000 spectators. A number exist in Greece, Sicily, Asia Minor, and elsewhere. No remains of private houses are known to exist. By the end of the Peloponnesian War (say 400 B.C.) the best period of Greek architecture was over; a noble simplicity had given place to excess of ornament. After the death of Alexander the Great (323) the decline was still more marked.

Among the Romans there was no original development of architecture as among the Greeks, though they early took the foremost place in the construction of such works of utility as aqueducts and sewers, the arch being in early and extensive use among this people. As a fine art, however, Roman architecture had its origin in copies of the Greek models, all the Grecian orders being introduced into Rome, and variously modified. Their number, moreover, was augmented by the addition of two new orders—the *Tuscan* and the *Composite*. The Romans became acquainted with the architecture of the Greeks soon after 200 B.C., but it was not till about two centuries later that the architecture of Rome attained (under Augustus) its greatest perfection. Among the great works then erected were temples, aqueducts, amphitheaters, magnificent villas, triumphal arches, monumental pillars, etc. The *amphitheater* differed from the theater in being a completely circular or rather elliptical building, filled on all sides with ascending seats for spectators and leaving only the central space, called the *arena*, for the combatants and public shows. The Coliseum is a stupendous structure of this kind. The



Roman Corinthian—Temple of the Sun, at Rome.

thermæ, or baths, were vast structures in which multitudes of people could bathe at once. Magnificent tombs were often built by the wealthy. Remains of private residences are numerous, and the excavations at Pompeii in particular have thrown great light on the internal arrangements of the Roman dwelling-house.



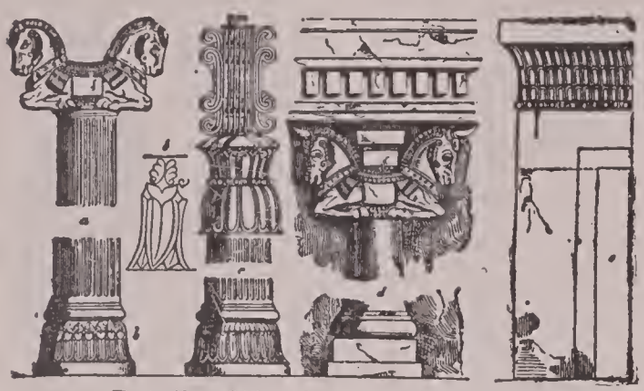
Byzantine—Church of our Lady, at Constantinople.

Almost all the successors of Augustus embellished Rome more or less, erected splendid palaces and temples, and adorned, like Hadrian, even the conquered countries with them. But after the period of Hadrian (117-138 A.D.) Roman architecture is considered to have been on the decline. The refined and noble style of the Greeks was neglected, and there was an attempt to embellish the beautiful more and more. This decline was all the more rapid later on from the disturbed state of the empire and the incursions of the barbarians.

In Constantinople, after its virtual separation from the Western Empire, arose a style of art and architecture which was practised by the Greek Church during the whole of the middle ages. This is called the Byzantine style. The church of St. Sophia at Constantinople, built by Justinian (reigned 527–565), offers the most typical specimen of the style, of which the fundamental principle was an application of the Roman arch, the dome being the most striking feature of the building. In the most typical examples the dome or cupola rests on four pendentives.

After the dismemberment of the Roman Empire the beautiful works of ancient architecture were largely destroyed by the Goths, Vandals, and other barbarians in Italy, Greece, Asia, Spain, and Africa; or what was spared by them was ruined by the fanaticism of the Christians. A new style of architecture now arose, two forms of which, the Lombard and the Norman Romanesque, form important phases of art. The Lombard prevailed in North

Italy and South Germany from the eighth or ninth to the thirteenth century (though the Lombard rule came to an end in 774); the Norman Romanesque



Details of Persian *Architecture.*

flourished, especially in Normandy and England, from the eleventh to the middle of the thirteenth century. The semicircular arch is the most characteristic feature of this style. With the Lombard Romanesque were combined Byzantine features, and buildings in the pure Byzantine style were also erected in Italy, as the Church of St. Mark at Venice.

The conquests of the Moors introduced a fresh style of architecture into Europe after the eighth century—the Moorish or Saracenic. This style accompanied the spread of Mohammedanism after its rise in Arabia in the seventh century. The edifices erected by the Moors and Saracens in Spain, Egypt, and Turkey are distinguished, among other things, by a peculiar form of the arch, which forms a curve constituting more than half of a circle or ellipse. A peculiar flowery decoration, called *arabesque*, is a common ornament of this style, of which the building called the Alhambra (see *Alhambra*) is perhaps the chief glory.

The Germans were unacquainted with architecture until the time of Charlemagne (or Charles the Great, 742–814). He introduced into Germany the Byzantine and Romanesque styles. Afterwards the Moorish or Arabian style had some influence upon that of the western nations, and thus originated the mixed style which maintained itself till the middle of the thirteenth century. Then began the modern Gothic style, which grew up in France, England, and Germany. Its striking characteristics are its pointed arches, its pinnacles and spires, its large buttresses, clustered pillars, vaulted roofs, profusion of ornament, and, on the whole, its lofty, bold character. Its most distinctive feature, as compared with the Greek or the Egyptian style, is the predominance in it of perpendicular or rising lines, producing forms that convey the idea of soaring or mounting upwards. Its greatest capabilities have been best displayed in ecclesiastical edifices. The Gothic style is divided into four principal epochs; the Early Pointed, or general style of the thirteenth century; the Decorated, or style of the fourteenth century; the Perpendicular, practised during the fifteenth and early part of the sixteenth centuries; and the Tudor, or general style of the sixteenth century. This style lasted in England up to the seventeenth century, being gradually displaced by that branch of the Renaissance or modified revival of ancient Roman architecture which is known as the *Elizabethan style*, and which is perhaps more purely an English style than any other that can be named.

The rise of the Renaissance style in Italy is the greatest event in the history of architecture after the introduction of the Gothic style. The Gothic style had been introduced into the country and extensively employed, but had never been thoroughly naturalized. The Renaissance is a revival of the classic style based on the study of the ancient models; and having practically commenced in Florence about the beginning of the fifteenth century, it soon spread with great rapidity over Italy and the greater part of Europe. The most illustrious architects of this early period of the style were

Romanesque—Cathedral of Worms.

Brunelleschi, who built at Florence the dome of the cathedral, the Pitti Palace, etc., besides many edifices at Milan, Pisa, Pesaro, and Mantua; Alberti, who wrote an important work on architecture, and erected many admired churches; Bramante, who began the building of St. Peter's, Rome, and Michael Angelo, who erected its magnificent dome. On St. Peter's were also employed Raphael, Peruzzi, and Sangallo. The noblest building in this style of architecture in Britain is St. Paul's, London, the work of Sir Christopher Wren.

Since the Renaissance period there has been no architectural development requiring special note. In edifices erected at the present day some one of the various styles of architecture is employed according to taste. Modern dwelling-houses have necessarily a style of their own so far as stories and apartments and windows and chimneys can give them one. In general the Grecian style, as handed down by Rome and modified by the Italian architects of the Renaissance, from its right angles and straight entablatures, is more convenient, and fits better with the distribution of our common edifices, than the pointed and irregular Gothic. But the occasional introduction of the Gothic outline and the partial employment of its ornaments has undoubtedly an agreeable effect both in public and private edifices; and we are indebted to it, among other things, for the spire, a structure exclusively Gothic, which, though often misplaced, has become an object of general approbation and a pleasing landmark to cities and villages. The works most characteristic of the present day are the grand bridges, viaducts, etc., in many of which iron is the sole or most characteristic portion of the material, and also the large and lofty mercantile buildings which are built upon a framework of steel columns and girders.

To compare the different countries in regard to their success in the field of modern architecture would be difficult, inasmuch as they have all produced architectural works worthy of their advances in material prosperity, education, and taste. Nor have the United States, Canada, and the Australian colonies shown themselves backward in following the lead of the older countries of Europe. In America the increase in the number of handsome buildings has been very noteworthy since the termination of the civil war.

A few words may be added on the architecture of India and China. Although many widely differing styles are to be found in India, the oldest and only true native style of Indian ecclesiastical architecture is the Buddhist, the earliest specimens dating to 250 B.C. Among the chief objects of Buddhist art are *stupas* or *topes*, built in the form of large towers, and employed as *dágobas* to contain relics of Buddha or of some noted saint. Other works of Buddhist art are temples or monasteries excavated from the solid rock, and supported by pillars of the natural rock left in their places. Buddhistic architecture is found in Ceylon, Thibet, Java, etc., as well as in India. The most remarkable Hindu or Brahmanical temples are in Southern India. They are pyramidal in form, rising in a series of stories. The Saracenic or Mohammedan architecture latterly introduced into India is of course of foreign origin. The Chinese have made the *tent* the elementary feature of their architecture; and of their style any one may form an idea by inspecting the figures which are depicted upon common chinaware. Chinese roofs are concave on the upper side, as if made of canvas instead of wood. (For further information on the different subjects pertaining to architecture see separate articles on the different styles—Greek, Roman, Gothic, etc.—and such entries as *Arch*, *Column*, *Aqueduct*, *Corinthian*, *Doric*, *Ionic*, *Theater*, etc.)

Architrave (är'ki-trāv), in architecture, the part of an entablature which rests immediately on the heads of the columns, being the lowest of its three principal divisions, the others being the *frieze* and the *cornice*.

Archives (är'kīvz). See *Records*.

Archivolt (är'ki-volt), in architecture, the ornamental band of mouldings on the face of an arch and following its contour.

Archons (är'konz), the chief magistrates of ancient Athens, chosen to superintend civil and religious concerns. They were nine in number; the first was properly the *archon*, or *archōn epōnymos*, by whose name the year was distinguished in the public records; the second was called *archōn basileus*, or king archon, who exercised the functions of high-priest; the third, *polemarchos*, or general of the forces. The other six were called *thesmothĕtai*, or *legislators*.

Archytas (ar-kī'tas), an ancient Greek mathematician, statesman, and general, who flourished about 400 B.C., and belonged to Tarentum, in Southern Italy. The invention of the analytic method in mathematics is ascribed to him, as well as the solution of many geometrical and mechanical prob-

lems. He constructed various machines and automata, among the most celebrated of which was his flying pigeon. He was a Pythagorean in philosophy, and Plato and Aristotle are said to have been both deeply indebted to him. Only inconsiderable fragments of his works are extant.

Arcis-sur-Aube (ar-sē-sür-ōb), a small town of France, dep. Aube, at which, in 1814, was fought a battle between Napoleon and the allies, after which the latter marched to Paris. Pop. (1906) 2803.

Arc-light, that species of the electric light in which the illuminating source is a current of electricity passing between two sticks of carbon kept a short distance apart, one of them being in connection with the positive, the other with the negative terminal of a battery or dynamo. A brilliant glow of light fills the space between the carbon poles.

Arco (ar'kō), a town of Tirol, near Lake Garda, a favorite winter resort for invalids. Pop. about 4,000.

Arcole (ar'ko-lā), a village in North Italy, 15 miles S. E. of Verona, celebrated for the battles of Nov. 15, 16, and 17, 1796, fought between the French under Bonaparte and the Austrians, in which the latter were defeated with great slaughter.

Arcos de la Frontera (ar'-kos dē lä fron-tā'-rä), a city of Spain, 30 miles E. by N. from Cadiz, on the Guadalete, here crossed by a stone bridge, on a sandstone rock 570 feet above the level of the river. On the highest part of the rock stands the castle of the dukes of Arcos, partly in ruins. The principal manufactures are leather, hats, and cordage. Pop. 13,926.

Arcot (ar-kot'), two districts and a small town of India, within the Presidency of Madras. NORTH ARCOT is an inland district with an area of 7,256 sq. m. The country is partly flat and partly mountainous, where intersected by the Eastern Ghâts.—SOUTH ARCOT lies on the Bay of Bengal, and has two seaports, Cuddalore and Porto Novo. Pop. about 4,500,000.—The town of ARCOT is in North ARCOT, on the Palar, about 70 miles W. by S. of Madras, a former military cantonment; now abandoned as such. The town contains handsome mosques, a nabob's palace in ruins, and the remains of an extensive fort. Arcot played an important part in the wars which resulted in the ascendency of the British in India. It was taken by Clive, 31st August, 1751, and heroically defended by him against an apparently overwhelming force under Chanda Sahib. Pop. about 12,000.

Arctic (ark'tik), an epithet given to the north pole from the proximity of the constellation of the Bear, in Greek called *arktos*. The *Arctic Circle* is an imaginary circle on the globe, parallel to the equator, and 23° 28′ distant from the north pole. This and its opposite, the *Antarctic*, are called the two polar circles.

Arctic Expeditions. See *North Polar Expeditions.*

Arctic Ocean, that part of the water surface of the earth which surrounds the north pole, and washes the northern shores of Europe, Asia, and America; its southern boundary roughly coinciding with the Arctic Circle (lat. 66° 32′ N.). It incloses many large islands, and contains large bays and gulfs which deeply indent the northern shores of the three continents. Its great characteristic is ice, which is nearly constant everywhere, though many parts of it are navigable in the brief summer season.

Arctic Regions, the regions round the north pole, and extending from the pole on all sides to the Arctic Circle in lat. 66° 32′ N. The Arctic or North Polar Circle just touches the northern headlines of Iceland, cuts off the southern and narrowest portion of Greenland, crosses Fox Strait north of Hudson Bay, whence it goes over the American continent to Bering Strait. Thence it runs to Obdorsk at the mouth of the Obi, then crossing northern Russia, the White Sea, and the Scandinavian Peninsula, returns to Iceland. It was long held as probable that the north pole was surrounded by an open sea. The sea is there, but it proves to be a frozen one, the Arctic Ocean having been widely investigated and the north pole reached in 1909 by a sledge journey across the ice. Valuable minerals, fossils, etc., have been discovered within the Arctic regions. In the archipelago north of the American continent excellent coal frequently occurs. The mineral cryolite is mined in Greenland. Fossil ivory (the tusks of the mammoth, *Elephas primigenius*) is obtained in islands at the mouth of the Lena. In Scandinavia, parts of Siberia, and northwest America, the forest region extends within the Arctic Circle. The most characteristic of the natives of the Arctic regions are the Eskimos. The most notable animals are the white or polar bear, the musk-ox, the reindeer, and the whalebone whale. Fur-bearing animals are numerous. The most intense cold ever

registered in those regions was 74° below zero Fahr. The aurora borealis is a brilliant phenomenon of Arctic nights. See *North Polar Expeditions.*

Arctium (ark'-ti-um). See *Burdock.*

Arctomys (ärk'to-mis). See *Marmot.*

Arcturus (ärk-tū'rus), a fixed star of the first magnitude in the constellation of Boötes. It is so called because it is situated near the tail of the Bear, its name signifying guardian of the bear. It is seen in the northern heavens.

Ardahan (är-dä-hän'), a small fortified town about 6400 feet above the sea, between Kars and Batúm, in Russian Armenia. It was captured by the Russians in 1877, and ceded to them by the Berlin treaty, 1878.

Ardea (är'de-a), the genus to which the heron belongs, type of the family *Ardēidæ*, which includes also the cranes, storks, bitterns, etc.

Ardebil, or ARDABIL (är-de-bēl') a Persian town, province of Azerbaijan, near the Kara Su, a tributary of the Aras, about 40 m. from the Caspian, in an elevated and healthy situation; it has mineral springs and a considerable trade. Pop. about 16,000.

Ardèche (ar-dāsh), a dep. in the south of France (Languedoc), on the west side of the Rhone, taking its name from the river Ardèche, which rises within it, and falls into the Rhone after a course of 46 miles; area, 2134 sq. miles. It is generally of a mountainous character, and contains the culminating point of the Cevennes. Silk and wine are produced. Annonay is the principal town, but Privas is the capital. Pop. (1906) 347,140.

Ardennes (ar-den'), an extensive tract of hilly land stretching over a large portion of the northeast of France and southwest of Belgium. Anciently the whole tract formed one immense forest (*Arduenna Silva* of Cæsar); but though extensive districts are still under wood, large portions are now occupied by cultivated fields and populous towns.

Ardennes (är-den'), a frontier department in the northeast of France; area, 2028 sq. miles, partly consisting of the Forest of Ardennes. There are extensive slate-quarries, numerous ironworks, and important manufactures of cloth, ironware, leather, glass, earthenware, etc. Chief towns, Mezières (the capital) and Sedan. Pop. 317,505.

Ardmore (ärd'mōr), a city, county seat of Carter county, Oklahoma, 90 miles S. E. of Oklahoma City, in a section whose resources include oil, gas, asphalt, coal and zinc; also cotton and general farm products. It has oil refineries, automobile-tire factories, cotton-seed oil mill, cotton gins and compress, woodworking mills, brick works, and many other industries. Pop. (1910) 8618; (1920) 14,181.

Ardoch (ar'dok), a parish in South Perthshire, celebrated for its Roman remains, one a camp, being the most perfect existing in Scotland.

Ardrossan (ar-dros'san), a seaport of Scotland, in Ayrshire, on the Firth of Clyde, with a good and spacious harbor, from which coal and iron are extensively exported. Pop. 5,933.

Are (är), the unit of the French land measure, equal to 100 square meters, or 1,076.44 square feet. A *hectare* is 100 ares, equal to 2.47 acres.

Area (ā're-a), the superficial content of any figure or space, the quantity of surface it contains in terms of any unit.

Areca (a-rē'ka), a genus of lofty palms with pinnated leaves and a drupe-like fruit enclosed in a fibrous rind. *A. Catĕchu* of the Coromandel and Malabar coasts is the common areca palm which yields areca or betel nuts, and also the astringent juice catechu. *A. oleracĕa* is the cabbage-tree or cabbage-palm of the West Indies. With lime and the leaves of the betel-pepper, the areca-nuts when green form the celebrated masticatory of the East. They are an important article in Eastern trade.

Arecibo (a-re-thē'bō), a seaport town on the north coast of the island of Porto Rico. Pop. (1910) 9612.

Areiopagus. See *Areopagus.*

Arena (a-rē'na), the enclosed space in the central part of the Roman amphitheaters, in which took place the combats of gladiators or wild beasts. It was usually covered with sand or sawdust to prevent the gladiators from slipping and to absorb the blood.

Arendal (ar'en-dal), a seaport of Southern Norway, exporting quantities of timber and iron and owning numerous ships. Pop. 11,130.

Arenicola (ar-en-ik'o-la). See *Lobworm.*

Areolar (a-rē'-ō-lar) TISSUE, an assemblage of fibers and laminæ pervading every part of the animal structure, and connected with each other so as to form innumerable small cavities, by means of which the various organs and parts of organs are connected together; called also *Cellular Tissue* and *Connective Tissue.*—In botany the term is sometimes

applied to the *non*-vascular substance, composed entirely of untransformed cells, which forms the soft substance of plants.

Areometer (ā-rē-om'e-tėr; from Greek *araios*, thin, *metron*, a measure), an instrument for measuring the specific gravity of liquids; a *hydrometer* (q. v.).

Areopagus (ā-ē-op'a-gus), the oldest of the Athenian courts of justice. It obtained its name from its place of meeting, on the Hill of Ares (Mars), near the citadel. It existed from very remote times, and the crimes tried before it were wilful murder, poisoning, robbery, arson, dissoluteness of morals, and innovations in the state and in religion. Its meetings were held in the open air, and its members were selected from those who had held the office of archon.

It is on a lesser hill, separated from the Acropolis by a very short saddle, so that it looks like a kind of outpost or spur sent out from the rock of the Acropolis. There are marks of old stairways cut in the rock, and to the right and left of the stairs are deep caverns, once the home of the Eumenides. On the flat top are still some signs of a rude smoothing of the stone for seats. Underneath is the site of the old *agora*, once surrounded with colonnades, the crowded market-place of those who sold and bought and bargained. Near the base of the hill, not much higher than the market-place, there is a semicircular platform backed by the rising rock. This was probably the old *orchestra*, possibly the site of the oldest theatre. It was doubtless here, just above the thoroughfare of the *agora*, that booksellers kept their stalls. It was on the Areopagus that the Apostle Paul made his great defense of Christianity against the Athenians who worshipped 'an Unknown God.' It is probable that he spoke from the lower platform, but some declare that he was taken to the top of Mars Hill and delivered his speech before the court of the Areopagus. According to Athenian legend it was to this court that Orestes was brought, accused of the murder of his mother, Clytemnestra, and pleaded his cause before Athena herself. He was acquitted on a tie vote, and the Furies were appeased by the establishment of their worship as the Eumenides at Athens.

Arequipa (ā-rā-kē'pà), a city of Peru, 200 miles south of Cuzco, situated in a fertile valley, 7850 feet above sea level. Before the earthquake of 1868, which almost totally destroyed it, it was one of the best-built towns of South America. Behind the city rises the volcano of Arequipa, or Peak of Misté (20,328 feet). A considerable trade is carried on through Mollendo, which has superseded Islay as the port of Arequipa, and is connected with it by railway. Pop. about 35,000.

Ares (ā'rēz). See *Mars*.

Arethusa (ar-e-thū'sa), in Greek mythology, a daughter of Nereus and Doris, a nymph, changed by Artĕmis into a fountain in order to free her from the pursuit of the river-god Alpheus.

Aretino (ä-rā-tē'nō), Guido. See *Guido*.

Aretino, Pietro, Italian poet, born at Arezzo, 1492, died at Venice, 1557; the natural son of a nobleman called Luigi Bacci. He early displayed a talent for satirical poetry, and when still a young man was banished from Arezzo on account of a sonnet against indulgences. He went to Perugia, and thence to Rome (1517), where he secured the papal patronage, but subsequently lost it through writing licentious sonnets. Through the influence of the Medici family he found an opportunity to insinuate himself into the favor of Francis I. In 1527 Aretino went to Venice, where he acquired powerful friends, among them the Bishop of Vicenza. By his devotional writings he regained the favor of the Roman court. The obscenity of some of his writings was such that his name has become proverbial for licentiousness.

Arezzo (ä-ret'sō, anc. *Arretium*), a city of Central Italy, capital of a province of the same name in Tuscany, near the confluence of the Chiana with the Arno. It has a noble cathedral, containing some fine pictures and monuments; remains of an ancient amphitheatre, etc. It was one of the twelve chief Etruscan towns, and in later times fought long against the Florentines, to whom it had finally to succumb. It is the birthplace of Mæcenas, Petrarch, Pietro Aretino, Redi, and Vasari. Pop. 16,780.—The province of Arezzo contains 1276 square miles and 275,588 inhabitants.

Argal, Argol, or Tartar, a hard crust formed on the sides of vessels in which wine has been kept, red or white, according to the color of the wine. It is an impure bitartrate of potassium, and is of considerable use among dyers as a mordant. When purified it forms cream of tartar (q. v.).

Argala (ar'ga-la). See *Adjutant-bird*.

Argali (ar'ga-li), a species of wild sheep (*Caprovis Argăli* or *Ovis ammon*) found on the mountains of Siberia, Central Asia, and Kamchatka. It is 4 feet high at the shoulders, and proportionately stout in its

build, with horns nearly 4 feet in length measured along the curve, and at their base about 19 inches in circumference. It lives in small herds.

Argall, Sir Samuel, one of the early English adventurers to Virginia, born about 1572; died 1626. He planned and executed the abduction of Pocahontas, the daughter of the Indian chief Powhatan, in order to secure the ransom of English prisoners. He was deputy-governor of Virginia (1617–1619), and was accused of many acts of rapacity and tyranny. In 1620 he served in an expedition against Algiers, and was knighted by James I.

Argan (är'gan), a low, spiny evergreen tree of the natural order *Sapotaceæ*, found in southern Morocco. It bears an ovate drupe about the size of a plum, with white, milky juice. The Moors extract from this fruit an oil which they use with their food.

Argand Lamp (är'gand), a lamp named after its inventor, Aimé Argand, a Swiss chemist and physician (born 1755; died 1803), the distinctive feature of which is a burner forming a ring or hollow cylinder covered by a chimney, so that the flame receives a current of air both on the inside and on the outside.

Argao, a town in the Philippine Islands. Pop.35,448.

Argaum (år-gâ'u̯m), a village of India, in Berar, celebrated for the victory of General Wellesley (Duke of Wellington) over the Mahrattas under Scindia and the Rajah of Berar, 28th November, 1803.

Argei (är-gē'i), a name given by the ancient Romans to a number of rush puppets (24 to 30) resembling men tied hand and foot, which were taken to the bridge over the Tiber by the pontifices, with the flaminica dialis in mourning guise, and thrown into the Tiber by the vestal virgins. No historical explanation of these curious rites exists.

Argelander (är'ge-län-dêr), Friedrich Wilhelm August, an eminent German astronomer, born at Memel, 1799; died 1875; director successively of the observatories of Abo and of Helsingfors; appointed professor of astronomy at Bonn, 1837, where he superintended the erection of a new observatory, catalogued over 320,000 stars, and produced several important astronomical works.

Argemone (är-jem'o-nē), a small genus of ornamental American plants of the poppy order. From the seeds of *A. Mexicāna* is obtained an oil very useful to painters. The handsomest species is *A. grandiflōra*, which has large flowers of a pure white color.

Argens, Jean Batiste de Boyer, Marquis d' (1704–1771), French man of letters, author of *Lettres juives.*

Argensola (år-*h*en-sō'lå), Lupercio and Bartolomé Leonardo de, brothers, the 'Horaces of Spain,' born at Barbastro, in Aragon, the former in 1559; died in 1613; the latter born in 1562; died in 1631. Lupercio produced tragedies and lyric poems; Bartolomé a number of poems and a history of the *Conquest of the Moluccas.* Their writings are singularly alike in character, and are reckoned among the Spanish classics.

Argenson (år-zhåṇ-sōṇ), Maro Pierre de Voyer, Comte d', celebrated French statesman, born in 1696; died in 1764. After holding a number of subordinate offices he became, in 1743, secretary of state for war. After the peace in 1748 he reorganized the army on the Prussian model. He was present at the battle of Fontenoy, and was exiled to his estate for some years through the machinations of Madame Pompadour.

Argent (är'jent), in coats of arms, the heraldic term expressing silver: represented in engraving by a plain white surface.

Argenta (är-jen'ta), the former name of a city of Pulaski county, Arkansas, on the north bank of the Arkansas River, opposite the city of Little Rock. It is now called North Little Rock (q.v.). Pop. (1920) 14,048.

Argentan (år-zhåṇ-täṇ), a French town, dep. of Orne (Normandy), with an old castle and some manufactures. Pop. 6870.

Argenteuil (år-zhäṇ-teuyė), a town in France, dep. Seine-et-Oise, 7 miles below Paris; has an active trade in wine, fruit, and vegetables. Pop. (1911) 24,282.

Argentiera (år-jen-ti-ē'rå), or Kimōli (ancient *Cimōlus*), an island in the Grecian archipelago, one of the Cyclades, about 18 miles in circumference, rocky and sterile. Produces a detergent chalk called *Cimolian earth*, used in washing and bleaching.

Argentine (är'jen-tēn), a silvery-white slaty variety of calcspar, containing a little silica with laminæ usually undulated. It is found in primitive rocks and frequently in metallic veins.—Argentine is also the name of a small European fish (*Scopĕlus boreālis*) of a silvery color.

Argentine (är'jen-tīn) Republic, formerly called the United Provinces of La Plata, now

popularly known as Argentina, a vast country of South America, the extreme length of which is 2,400 miles, and the average breadth a little over 700 miles. the total area comprising 1,113,850 sq. miles. It is bounded on the N. by Bolivia; on the E. by Paraguay, Brazil, Uruguay, and the Atlantic; on the S., by the Antarctic Ocean; and on the W. by the Andes. It comprises four great natural divisions: (1) the Andine region, containing the provinces of Mendoza, San Juan, Rioja, Catamarca, Tucuman, Salta, and Jujuy; (2) the Pampas, containing the provinces of Santiago, Santa Fé, Cordova, San Luis, and Buenos Ayres; with the territories Formosa, Pampa, and Chaco; (3) the Argentine Mesopotamia, between the rivers Paraná and Uruguay, containing the provinces of Entre Rios and Corrientes, and the territory Misiones; (4) Patagonia, including the eastern half of Tierra del Fuego. With the exception of the N. W., where lateral branches of the Andes run into the plain for 150 or 200 miles, and the province of Entre Rios, which is hilly, the characteristic feature of the country is the great monotonous and level plains called 'pampas,' In the north these plains are partly forest-covered, but all the central and southern parts present vast treeless tracts, which afford pasture to immense herds of horses, oxen, and sheep, and are varied in some places by brackish swamps, in others by salt steppes. The great watercourse of the country is the Paraná, having a length of fully 2,000 miles from its source in the mountains of Goyaz, Brazil, to its junction with the Uruguay, where begins the estuary of La Plata. The Paraná is formed by the union of the Upper Paraná and Paraguay rivers, near the N. E. corner of the State. Important tributaries are the Pilcomayo, the Vermejo, and the Salado. The Paraná, Paraguay, and Uruguay are valuable for internal navigation. Many of the streams which tend eastward terminate in marshes and salt lakes, some of which are rather extensive. Not connected with the La Plata system are the Colorado and the Rio Negro, forming the northern boundary of Patagonia. The source of the Negro is Lake Nahuel Huapi, in Patagonia (area, 1,200 sq. miles), in the midst of magnificent scenery. The level portions of the country are mostly of tertiary formation, and the river and coast regions consist mainly of alluvial soil of great fertility. In the pampas clay have been found the fossil remains of extinct mammalia, some of them of colossal size.

European grains and fruits, including the vine, have been successfully introduced, and are cultivated to some extent in most parts of the republic, but the great wealth of the State lies in its countless herds of cattle and horses and flocks of sheep, which are pastured on the pampas, and which multiply there very rapidly. Gold, silver, nickel, copper, tin, lead, and iron, besides marble, jasper, precious stones, and bitumen, are found in the mountainous districts of the N. W., while petroleum wells have been discovered on the Rio Vermejo; but the development of this mineral wealth has hitherto been greatly retarded by the want of proper means of transport. The most extensive forests in the State are in the region of the Gran Chaco (which extends also into Bolivia), where there is known to be 60,000 sq. miles of timber. Cacti and thistles form great thickets in parts of the country. Peach and apple trees are abundant in some districts. The native fauna includes the puma, the jaguar, the tapir, the llama, the alpaca, the vicuna, armadillos, the rhea or nandu, a species of ostrich, etc. The climate is agreeable and healthy, 97° being about the highest temperature experienced. Agriculture has of late years made great progress, large and increasing quantities of cotton, wheat, sugar-cane, tobacco, oats, maize, etc., being grown. The wheat crop is of especial importance, reaching about 200,000,000 bushels and fast increasing. The manufactures include flour, cloths, blankets, and large establishments for meat packing, etc.

As a whole, this vast country is very thinly inhabited, some parts of it as yet being very little known. The native Indians were never very numerous, and have given little trouble to the European settlers. Tribes of them yet in the savage state still inhabit the less known districts, and live by hunting and fishing. Some of the Gran Chaco tribes are said to be very fierce, and European travelers have been killed by them. The European element is strong in the republic, more than half the population being Europeans or of pure European descent. Large numbers of immigrants arrive from Southern Europe, the Italians having the preponderance among those of foreign birth. The typical inhabitants of the pampas are the *Gauchos*, a race of half-breed cattle-rearers and horse-breakers; they are almost continually on horseback galloping over the plains, collecting their herds and droves, taming wild horses, or catching and slaughtering cattle. In such occupations

they require a marvellous dexterity in the use of the lasso and bolas.

The river La Plata was discovered in 1512 by the Spanish navigator Juan Diaz de Solis, and the La Plata territory had been brought into the possession of Spain by the end of the sixteenth century. In 1810 the territory cast off the Spanish rule, and in 1816 the independence of the United States of the Rio de la Plata was formally declared, but it was long before a settled government was established. The present constitution dates from 1853, being subsequently modified. The executive power is vested in a president—elected by the representatives of the fourteen provinces for a term of six years. A national congress of two chambers—a senate and a house of deputies—wields the legislative authority, and the republic is making rapid advances in social and political life. The external commerce is important, the chief exports being wheat, corn, wool, skins, and hides, frozen beef and mutton, tallow, bones, and flax. The wheat export is large. The imports are chiefly cotton manufactures, woolens, iron and steel manufactures, chemicals, coal, coke, apparel, vehicles, paper, linen, etc. Pop. 8,279,000. Capital, Buenos Ayres.

During the European war (q. v.) the Argentine Republic was on the brink of entering the war against Germany because of the sinking of Argentine ships by German submarines. Following the exposure of breaches of neutrality on the part of Count von Luxburg, the German minister, the Argentine Senate in September, 1917, voted for severance of diplomatic relations. The Chamber of Deputies did likewise, but the President vetoed the measures.

Argentine (ar'jen-tīn), a suburb of Kansas City, Kans. Here are large gold and silver smelting works and iron shops.

Argentite (ar'jen-tīt), sulphide of silver, a blackish or lead-gray mineral, a valuable ore of silver found in the crystalline rocks of many countries.

Argillaceous (ar'jil-ā'shus) Rocks are rocks in which clay prevails (including shales and slates).

Argives (ar'jīvz), or Argivi, the inhabitants of Argos; used by Homer and other ancient authors as a generic appellation for all the Greeks.

Argol. See *Argal.*

Argon, a gas rather heavier than nitrogen, found in the air in very small quantity in 1894, by Prof. Ramsay and Lord Rayleigh. Its proportions are 1 of argon to 100 of air. Its marked property is its inactivity—hence the name. One way of obtaining this element is by passing air over heated copper, which combines with the oxygen, then over heated magnesium, which combines with the nitrogen, leaving the argon. Another method is by heating magnesium dust with dehydrated quick-lime.

Argonaut (ar'gō-nawt), a molluscous animal of the genus *Argonauta,* belonging to the dibranchiate or two-gilled cuttle-fishes, distinguished by the females possessing a single-chambered external shell, not organically connected with the body of the animal. The males have no shell and are of much smaller size than the females. The shell is fragile, translucent, and boat-like in shape; it serves as the receptacle of the ova or eggs of the female, which sits in it with the respiratory tube or 'funnel' turned towards the carina or 'keel.' This famed mollusc swims only by ejecting water from its funnel, and it can crawl in a reversed position, carrying its shell over its back like a snail. The fact that it rises to the surface of the sea in calm weather and drifts about has given rise to its fanciful name and many fables. See also *Octopus.*

Argonauts, in the legendary history of Greece, those heroes who performed a hazardous voyage to Colchis, a far-distant country at the eastern extremity of the Euxine (Black Sea), with Jason in the ship *Argo,* for the purpose of securing the golden fleece, which was preserved suspended upon a tree, and under the guardianship of a sleepless dragon. By the aid of Medea, daughter of the King of Colchis, Jason was enabled to seize the fleece, and after many strange adventures, to reach his home at Iolcos in Thessaly. Among the Argonauts were Hercules, Castor and Pollux, Orpheus and Theseus.

Argo-Navis, the southern constellation of the Ship, containing the large white star Canopus, one of the brightest stars in the southern skies.

Argonne (ar-gon'), a rocky, forest-clad plateau in northeast France in the Departments of Ardennes, Meuse and Marne, extending along the border of Lorraine and Champagne. It is celebrated for the campaign of Dumouriez against the Prussians in 1792, and especially for the battles fought on its soil in the great European war (q. v.), 1914-1918. Following the taking of the St. Mihiel (q. v.) salient late in September, 1918, the American troops moved toward the area back of the line between the Meuse river and the western edge of the forest of Argonne near Mezières and Sedan, where the Germans had four years' accumulation of plants and material and important railroad communications. On the night of September 25 they took the

German first-line defenses. Though the forest proved to be a veritable nest of machine-guns, which mowed down the men in fearful numbers, the Americans could not be halted. By November 6 they had reached a point on the Meuse opposite Sedan, and the objective of their splendid advance was theirs. They had over 26,000 prisoners and more than 500 guns to their credit when, on November 11, the armistice brought an end to hostilities.

Argos (ar'gos), a town of Greece, in the northeast of the Peloponnesus, between the gulfs of Ægina and Nauplia or Argos, Pop. 9980. This town and the surrounding territory of Argolis were famous from the legendary period of Greek history onwards, the territory containing, besides Argos, Mycenæ, where Agamemnon ruled, with a kind of sovereignty, over all the Peloponnesus.

Argostoli (ar-gos'to-li), a city of the Ionian Islands, capital of Cephalonia, and the residence of a Greek bishop. Pop. 9241.

Argosy (ar'go-si), a poetical name for a large merchant vessel; derived from *Ragusa*, a port which was formerly more celebrated than now, and whose vessels did a considerable trade with England.

Argot (Fr.; ar gō), the jargon, slang, or peculiar phraseology of a class or profession, originally the conventional slang of thieves and vagabonds, invented for the purpose of disguise and concealment.

Arguim, or ARGUIN (ar-gwim', ar-gwin'), a small island on the west coast of Africa, not far from Cape Blanco, formerly a center of trade the possession of which was violently disputed by the Portuguese, Dutch, English and French.

Argument (ar'gu-ment), a term sometimes used as synonymous with the subject of a discourse, but more frequently appropriated to any kind of method employed for the purpose of confuting or at least silencing an opponent. Logicians have reduced arguments to a number of distinct heads, such as the *argumentum ad judicium*, which founds on solid proofs addresses to the judgment; the *argumentum ad verecundiam*, which appeals to the modesty or bashfulness of an opponent by reminding him of the great names or authorities by whom the view disputed by him is supported; the *argumentum ad ignorantiam*, the employment of some logical fallacy towards persons likely to be deceived by it; and the *argumentum ad hominem*, an argument which presses a man with consequences drawn from his own principles and concessions, or his own conduct.

Argus (ar'gus), in Greek mythology, a fabulous being, said to have had a hundred eyes, placed by Juno to guard Io. Hence 'argus-eyed,' applied to one who is exceedingly watchful.

Argus-pheasant (*Argus gigantēus*), a large, beautiful, and very singular species of pheasant, found native in the southeast of Asia, more especially in Sumatra and some of the other islands. The males measure from 5 to 6 feet from the tip of the beak to the extremity of the tail, which has two greatly elongated central feathers. The plumage is exceedingly beautiful, the secondary quills of the wings, which are longer than the primary feathers, being each adorned with a series of ocellated or eye-like spots (whence the name—see *Argus*) of brilliant metallic hues. The general body plumage is brown.

Argyle, or ARGYLL (ar-gīl'), an extensive county in the southwest of the Highlands of Scotland, consisting partly of mainland and partly of islands belonging to the Hebrides group, the chief of which are Islay, Mull, Jura, Tiree, Coll, Rum, Lismore, and Colonsay, with Iona and Staffa. On the land side the mainland is bounded north by Inverness; east by Perth and Dumbarton; elsewhere surrounded by the Firth of Clyde and its connections and the sea; area, 3255 sq. m. of which the islands comprise about 1000 sq. m. It is greatly indented by arms of the sea, which penetrate far inland. The mainland is divided into the six districts of Northern Argyle, Lorn, Argyle, Cowal, Knapdale, and Kintyre. The county is exceedingly mountainous and has several lakes, the principal of which is Loch Awe. Cattle and sheep are reared in numbers, and fishing is largely carried on, as is also the making of whisky. There is but little arable land. The chief minerals are slate, marble, limestone, and granite. County town, Inverary; others, Campbelton, Oban, and Dunoon. Pop. 1901, 73,642.

Argyle, CAMPBELLS OF, a historic Scottish family, raised to the peerage in the person of Sir Duncan Campbell of Lochow, in 1445. The more eminent members are: (1) ARCHIBALD, 2d earl, killed at the battle of Flodden, 1513.—ARCHIBALD, 5th earl, attached himself to the party of Mary of Guise, and was the means of averting a collision between the Reformers and the French troops in 1559; was commissioner of regency after Mary's abdication, but

afterwards commanded her troops at the battle of Langside; died 1573.—ARCHIBALD, 8th earl and marquis, born 1598; a zealous partisan of the Covenanters; created a marquis by Charles I. It was by his persuasion that Charles II visited Scotland, and was crowned at Scone in 1651. At the Restoration he was committed to the Tower, and afterwards sent to Scotland, where he was tried for high treason, and beheaded in 1661.—ARCHIBALD, 9th earl, son of the preceding, served the king with great bravery at the battle of Dunbar, and was excluded from the general pardon by Cromwell in 1654. On the passing of the Test Act in 1681 he refused to take the required oath except with a reservation. For this he was tried and sentenced to death. He, however, escaped to Holland, from whence he returned with a view of aiding the Duke of Monmouth. His plan, however, failed, and he was taken and conveyed to Edinburgh where he was beheaded in 1685.—ARCHIBALD, 10th earl and 1st duke, son of the preceding, died 1703; took an active part in the revolution of 1688–89, which placed William and Mary on the throne, and was rewarded by several important appointments and the title of duke.—JOHN, 2d duke and Duke of Greenwich, son of the above, born 1678, died 1743; served under Marlborough at the battles of Ramilies, Oudenarde, and Malplaquet, and assisted at the sieges of Lisle and Ghent. He incurred considerable odium in his own country for his efforts in promoting the union. In 1712 he had the military command in Scotland, and in 1715 he fought an indecisive battle with the Earl of Mar's army at Sheriffmuir, near Dunblane, and forced the Pretender to quit the kingdom. He was long a supporter of Walpole, but his political career was full of intrigue. He is the Duke of Argyle in Scott's *Heart of Midlothian*.—GEORGE DOUGLAS CAMPBELL, 8th duke, Baron Sundridge and Hamilton, was born in 1823. He early took a part in politics, especially in discussions regarding the Presbyterian Church of Scotland. In 1852 he became lord privy seal under Lord Aberdeen, and again under Lord Palmerston in 1859; postmaster-general in 1860; secretary for India from 1868 to 1874; again lord privy seal in 1880, but retired, being unable to agree with his colleagues on Heir Irish policy. He was author of *The Reign of Law*, etc. Died 1900. this eldest son, the MARQUIS OF LORNE (1845–1914), married the Princess Louise, fourth daughter of Queen Victoria, in 1871. He was governor-general of Canada 1878–83.

Argyro-Castro (ar'gi-rō-Kas-trō), a town of Turkey, in Albania, 40 miles northwest of Janina; built on three ridges intersected by deep ravines, across which are several bridges. Pop. about 20,000.

Argyropulos (ar-ji-rop'u-los), JOHANNES, one of the principal revivers of Greek learning in the fifteenth century. Born in Constantinople 1415; died at Rome in 1486.

Aria (ār'i-a), in music. See *Air*.

Ariadne (a-ri-ad'ne), in Greek mythology, a daughter of Minos, King of Crete. She gave Theseus a clue of thread to conduct him out of the labyrinth after his defeat of the Minotaur. Theseus abandoned her on the Isle of Naxos, where she was found by Bacchus, who married her.

Ariana (ar-i-a'na), the ancient name of a large district in Asia, forming a portion of the Persian Empire; bounded on the north by the provinces of Bactriana, Margiana, and Hyrcania; east by the Indus; south by the Indian Ocean and the Persian Gulf; west by Media.

Ariano (a-rē-ä'nō), a town in South Italy, province of Avellino, 44 miles N. E. of Naples, the seat of a bishop, with a handsome cathedral. Pop. 8360.

Arians (ār'i-anz), the adherents of the Alexandrian priest Arius, who, about A.D. 318, promulgated the doctrine that Christ was a created being inferior to God the Father in nature and dignity, though the first and noblest of all created beings; that He was not the 'Word,' or 'Wisdom,' and that He was created out of nothing. These doctrines were condemned by the Council of Nicæa in 325. Arius died in 336, and after his death his party gained considerable accessions, including several emperors, and for a time held a strong position. Since the middle of the seventh century, however, the Arians have nowhere constituted a distinct sect, although similar opinions have been advanced by various theologians in modern times.

Arica (a-rē'ka), a seaport of Chile, 30 miles S. of Tacna; previous to 1880 it belonged to Peru. It has suffered frequently from earthquakes, being in 1868 almost entirely destroyed, part of it being also submerged by an earthquake wave. Pop. about 3000.

Arichat (ar-i-shat'), a seaport town and fishing station of Nova

Scotia, on a small bay, S. coast of Madame Island. Pop. about 2000.

Arid Region, the name applied to that portion of the United States which owing to the paucity of rainfall is little more than a vast desert. The name has particular application to that section of country known as the Great American Desert, which roughly comprises much of the territory of Utah, Nevada, Arizona, eastern and southern California, New Mexico, and extends into the States of Sonora and Sinaloa in Mexico. In the more cultivable areas of this arid section irrigation has been put in operation by the federal government, and this has resulted in the establishment of prosperous centers of industry where before the land was a sterile waste. Much of the region, however, on account of its distance from water supply must for a long time resist all efforts at reclamation. In such places as Death Valley and the Yuma Desert the annual rainfall is less than 5 inches, these two regions being probably the driest in the world.

Ariège (ä-rē-āzh), a mountainous department of France, on the northern slopes of the Pyrenees, comprising the ancient countship of Foix and parts of Languedoc and Gascony. The principal rivers are the Ariège, Arize, and Salat, tributaries of the Garonne. Sheep and cattle are reared; the arable land is inconsiderable in extent. Capital, Foix. Area, 1890 square miles; pop. 205,684.

Ariel (ā'ri-el), the name of several personages mentioned in the Old Testament; in the demonology of the later Jews a spirit of the waters. In Shakespere's *Tempest*, Ariel was the 'tricksy spirit' whom Prospero had in his service.

Aries (ā'ri-ēz; Latin), the Ram, the first of the twelve signs in the zodiac, which the sun enters at the vernal equinox, about the 21st of March. Owing to the precession of the equinoxes the sign Aries no longer corresponds with the constellation Aries, which it did 2000 years ago. It is at present in the constellation Pisces, about 30° west of the original sign.

Aril, Arillus (ar'il, a-ril'us), in some plants, as in the nutmeg, an extra covering of the seed, outside of the true seed-coats, proceeding from the placenta, partially investing the seed, and falling off spontaneously. It is either succulent or cartilaginous and colored, elastic, rough, or knotted. In the nutmeg it is known as *mace*.

Arimaspians (ar-i-mas'pi-ans), in ancient Greek traditions a people who lived in the extreme northeast of the ancient world. They were said to be one-eyed and to carry on a perpetual war with the gold-guarding griffins, whose gold they endeavored to steal.

Arimathæa (ar-i-ma-thē'a), a town of Palestine, identified with the modern *Ramleh*, 22 m. W. N. W. of Jerusalem.

Arion (ar-ī'on), an ancient Greek poet and musician, born at Methymna, in Lesbos; flourished about B.C. 625. He lived at the court of Periander of Corinth, and afterwards visited Sicily and Italy. Returning from Tarentum to Corinth with rich treasures, the avaricious sailors resolved to murder him. Apollo, however, having informed him in a dream of the impending danger, Arion in vain endeavored to soften the hearts of the crew by the power of his music. He then threw himself into the sea, when one of a shoal of dolphins, which had been attracted by his music, received him on his back and bore him to land. The sailors, having returned to Corinth, were confronted by Arion, and convicted of their crime. The lyre of Arion, and the dolphin which rescued him, became constellations in the heavens. A fragment of a hymn to Poseidon, ascribed to Arion, is extant.

Ariosto (ar-i-os'tō), Ludovi'co, one of the most celebrated poets of Italy, was born at Reggio, in Lombardy, September 8, 1474, of a noble family; died June 6, 1533. His lyric poems in the Italian and Latin languages, distinguished for ease and elegance of

Ludovico Ariosto.

style, introduced him to the notice of the Cardinal Ippolito d'Este, son of Duke Ercole I of Ferrara. In 1503 Ippolito took him with him on a journey to Hungary. In this service he began and

finished, in ten or eleven years, his immortal poem, the *Orlando Furioso*, which was published in 1515, and immediately became highly popular. He afterwards entered the service of Alfonso I, Duke of Ferrara, the cardinal's brother. The *Orlando Furioso* is a continuation of the *Orlando Innamorata* of Bojardo, details the chivalrous adventures of the paladins of the age of Charlemagne, and extends to forty-six cantos. The best English translation is that of Rose.

Arisaka (ăr-i-sä'ka), Baron Narıaka, a Japanese soldier and inventor of a new type of quick-firing gun, born in 1852; died January 11, 1915. He was created a baron for his services in the Russo-Japanese war, and was made lieutenant-general in 1903.

Aristæus (ar-is-tē'us), in Greek mythology, son of Apollo and Cyrene, the introducer of bee-keeping.

Aristarchus (a-ris-tär'kus), a Greek grammarian, born at Samothrace; died at Cyprus; flourished about 155 B.C. He criticised Homer's poems with the greatest acuteness and ability, endeavoring to restore the text to its genuine state, and to clear it of all interpolations and corruptions; hence the phrase, Aristarchian criticism. His edition of Homer furnished the basis of all subsequent ones.

Aristarchus, an ancient Greek astronomer belonging to Samos, flourished between 280 and 264 B.C., and first asserted the revolution of the earth about the sun; also regarded as the inventor of the sun-dial.

Aristeas (a-ris'te-as), a personage of ancient Greek legend, represented to have lived over many centuries, disappearing and reappearing by turns.

Aristides (a-ris-tī'dēz), a statesman of ancient Greece, for his strict integrity surnamed the *Just*. He was one of the ten generals of the Athenians when they fought with the Persians at Marathon, B.C. 490. Next year he was eponymous archon, and in this office enjoyed such popularity that he excited the jealousy of Themistocles, who succeeded in procuring his banishment by the ostracism (about 483). Three years after, when Xerxes invaded Greece with a large army, the Athenians hastened to recall him, and Themistocles now admitted him to his confidence and councils. In the battle of Platæa (479) he commanded the Athenians, and had a great share in gaining the victory. To defray the expenses of the Persian war he persuaded the Greeks to impose a tax, which should be paid into the hands of an officer appointed by the states collectively, and deposited at Delos. The confidence which was felt in his integrity appeared in their entrusting him with the office of apportioning the contribution. He died at an advanced age about B.C. 468, so poor that he was buried at the public expense.

Aristippus (a-ris-tip'pus), a disciple of Socrates, and founder of a philosophical school among the Greeks, which was called the *Cyrenaic*, from his native city Cyrēnē, in Africa; flourished 380 B.C. His moral philosophy differed widely from that of Socrates, and was a science of refined voluptuousness. His fundamental principles were—that all human sensations may be reduced to two, pleasure and pain. Pleasure is a gentle and pain a violent emotion. All living beings seek the former and avoid the latter. Happiness is nothing but a continued pleasure, composed of separate gratifications; and as it is the object of all human exertions we should abstain from no kind of pleasure. Still we should always be governed by taste and reason in our enjoyments. His doctrines were taught only by his daughter, Arētē, and by his grandson, Aristippus the younger, by whom they were systematized. Other Cyrenaics compounded them into a particular doctrine of pleasure, and established a cult. The time of his death is unknown. His writings are lost.

Aristocracy (ăr-is-tok'ra-si; Greek *aristos*, best, *kratos*, rule), a form of government by which the wealthy and noble, or any small privileged class, rules over the rest of the citizens; now mainly applied to the nobility or chief persons in a state.

Aristogeiton (-gīton), a citizen of Athens, whose name is rendered famous by a conspiracy (514 B.C.) formed in conjunction with his friend Harmodius against the tyrants Hippias and Hipparchus, the sons of Pisistratus. Both Aristogeiton and Harmodius lost their lives through their attempts to free the country, and were reckoned martyrs of liberty.

Aristolochia (a r-i s-t o-l ō'k i-a), a genus of dicotyledonous, apetalous plants, the type and principle genus of the family *Aristolochiaceæ*, chiefly woody climbers; widely distributed. Eleven species are found in the United States. The species are all remarkable for their curious flowers, which present many variations, but are all constructed to capture and hold insects. The relative position of the anthers and stigmas prevents fertilization without the aid of insects. In *A. clematitis* insects bringing pollen are hindered from egress from the flower by impeding hairs, but are re-

leased by the withering of these hairs when the pollen is shed. *A. sipho* (Dutchman's pipe), is cultivated as a climber.

Aristophanes (-tof'a-nēz), the greatest comic poet of ancient Greece, born at Athens probably about the year 444 B.C.; died not later than B.C. 380. Little is known of his life. He appeared as a poet in B.C. 427, and having indulged in some sarcasms on the powerful demagogue, Cleon, was ineffectually accused by the latter of having unlawfully assumed the title of an Athenian citizen. He afterwards revenged himself on Cleon in his comedy of the *Knights*, in which he himself acted the part of Cleon, because no actor had the courage to do it. Of fifty-four comedies which he composed, eleven only remain; believed to be the flower of the ancient comedy, and distinguished by wit, humor, and poetry, as also by grossness. In them there is constant reference to the manners, actions, and public characters of the day, the freedom of the old Greek comedy allowing an unbounded degree of personal and political satire. The names of his extant plays are *Acharnians*, *Knights*, *Clouds*, *Wasps*, *Peace*, *Birds*, *Lysistrata*, *Thesmophoriazusæ*, *Frogs*, *Ecclesiasuzæ*, and *Plutus*.

Aristotle (ăr'is-totl; Gr. *Aristot'eles*) a distinguished philosopher and naturalist of ancient Greece, the founder of the Peripatetic school of philosophy, was born in 384 B.C. at Stagīra, in Macedonia, died at Chalcis, B.C. 322. His father, Nicomachus, was physician to Amyntas II, king of Macedonia, and claimed to be descended from Æsculapius. Aristotle had lost his parents before he came, at about the age of seventeen, to Athens to study in the school of Plato. With that philosopher he remained for twenty years, became preeminent among his pupils, and was known as the 'intellect of the school.' Upon the death of Plato, 348 B.C., he took up his residence at Atarneus, in Mysia, on the invitation of his former pupil, Hermeias, the ruler of that city, on whose assassination by the Persians, 343 B.C., he fled to Mitylene with his wife, Pythias, the niece of Hermeias. During his residence at Mitylene he received an invitation from Philip of Macedon to superintend the education of his son, Alexander, then in his fourteenth year. This relationship between the great philosopher and the future conqueror continued for a number of years, during which the prince was instructed in grammar, rhetoric, poetry, logic, ethics, and politics, and in those branches of physics which had even then made some considerable progress. On Alexander succeeding to the throne Aristotle continued to live with him as his friend and councilor till he set out on his Asiatic campaign (334 B.C.). He returned to Athens and established his school in the Lyceum, a gymnasium attached to the temple of Apollo Lyceius, which was assigned to him by the state. He delivered his lectures in the wooded walks of the Lyceum while walking up and down with his pupils. From the action itself, or more probably from the name of the walks (*peripatoi*), his school was called Peripatetic. Pupils gathered to him from all parts of Greece, and his school became by far the most popular in Athens. The statement that he had two circles of pupils, the *exoteric* and the *esoteric*, has given rise to much controversy. By some it has been held that Aristotle published during his lifetime popular discourses with a view to make way for his doctrines in Athenian society, then impregnated with Platonic theories, and that these are called exoteric in contradistinction to those in which are embodied his matured opinions. It was during the time of his teaching at Athens that Aristotle is believed to have composed the great bulk of his works. On the death of Alexander a revolution occurred in Athens hostile to the Macedonian interests with which Aristotle was identified. He therefore retired to Chalcis, where he soon after died. According to Strabo, he bequeathed all his works to Theophrastus, who, with other disciples of Aristotle, amended and continued them. They afterwards passed through various hands, till, about 50 B.C., Andronicus of Rhodes put the various fragments together and classified them according to a systematic arrangement. Many of the books bearing his name are spurious, others are of doubtful genuineness. The whole are generally divided into logical, theoretical, and practical. The logical works are comprehended under the title Organon (instrument). The theoretical are divided into physics, mathematics, and metaphysics. The physical works (including those on natural history) are on the *General Principles of Physical Science*, *The Heavens*, *Generation and Destruction*, *Meteorology*, *Natural History of Animals*, *On the Parts of Animals*, *On the Generation of Animals*, *On the Locomotion of Animals*, *On the Soul*, *On Memory*, *Sleep and Waking*, *Dreams*, *Divination*. In mathematics there are two treatises, *On Indivisible Lines and Mechanical Problems*. The *Metaphysics* consist of fourteen books; the title (*Ta meta ta Physika*, 'the things following the Physics') is

the invention of an editor. The practical works embrace ethics, politics, economics, and treatises on art, and comprise the *Nicomachæan Ethics* (so called because dedicated to his son, Nicomachus), the *Politics*, *Œconomics*, *Poetry*, and *Rhetoric*. Among the lost works are the dialogues and others to which the term exoteric is applied, and which were published during Aristotle's lifetime. His style is devoid of grace and elegance. His works were first printed in a Latin translation, with the commentaries of Averroes, at Venice in 1489; the first Greek edition was that of Aldus Manutius (five vols., 1495–98). For an account of the philosophy of Aristotle see *Peripatetics*.

Aristoxenus (ar-is-toks'e-nus), an ancient Greek musician and philosopher of Tarentum, born about B.C. 324. He studied music under his father Spintharus, and philosophy under Aristotle, whose successor he aspired to be. He endeavored to apply his musical knowledge to philosophy, and especially to the science of mind, but it only appears to have furnished him with far-fetched analogies and led him into a kind of materialism. There is a work by him on the *Elements of Harmony*.

Arithmetic (a-rith'met-ik; Greek *arithmos*, number) is primarily the science of numbers. As opposed to algebra it is the practical part of the science. Although the processes of arithmetical operations are often highly complicated, they all resolve themselves into the repetition of four primary operations, addition, subtraction, multiplication, and division. Of these, the two latter are only complex forms of the two former, and subtraction again is merely a reversal of the process of addition. Little or nothing is known as to the origin and invention of arithmetic. Some elementary conception of it is in all probability coeval with the first dawn of human intelligence. In consequence of their rude methods of numeration, the science made but small advance among the ancient Egyptians, Greeks, and Romans, and it was not until the introduction of the decimal scale of notation and the Arabic, or rather Indian, numerals into Europe that any great progress can be traced. In this scale of notation every number is expressed by means of the ten digits, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, by giving each digit a local as well as its proper or natural value. The value of every digit increases in a tenfold proportion from the right towards the left; the distance of any figure from the right indicating the power of 10, and the digit itself the number of those powers intended to be expressed: thus $3464=3000+400+60+4=3\times10^3+4\times10^2+6\times10+4$. The earliest arithmetical signs appear to have been hieroglyphical, but the Egyptian hieroglyphics were too diffuse to be of any arithmetical value. The units were successive strokes to the number required, the ten an open circle, the hundred a curled palm-leaf, the thousand a lotus flower, ten thousand a bent finger. The letters of the alphabet afforded a convenient mode of representing figures, and were used accordingly by the Chaldeans, Hebrews, and Greeks. The first nine letters of the Hebrew alphabet represented the units, the second nine tens, the remaining four together with five repeated with additional marks, hundreds; the same succession of letters with added points was repeated for thousands, tens of thousands, and hundreds of thousands. The Greeks followed the same system up to tens of thousands. They wrote the different classes of numbers in succession as we do, and they transferred operations performed on units to numbers in higher places; but the use of different signs for the different ranks clearly shows a want of full perception of the value of place as such. They adopted the letter M as a sign for 10,000 and by combining this mark with their other numerals they could note numbers as high as 100,000,000. The Roman numerals which are still used in marking dates or numbering chapters were almost useless for purposes of computation. From one to four were represented by vertical strokes, I, II, III, IIII, five by V, ten by X, fifty by L, one hundred by [, afterwards C, five hundred by D, a thousand by M. These signs were derived from each other according to particular rules, thus V was the half of X, ∧ being also used; L was likewise the half of [. M was artistically written M and ↀ, and IↃ, afterwards D, became five hundred. ↀI represented 5000, ↀↀↃↃ 10,000 IↃↃↃ 50,000, ↀↀↀIↃↃↃ 100,000. They were also compounded by addition and subtraction, thus IV stood for four, VI for six, XXX for thirty, XL for forty, LX for sixty. Arithmetic is divided into *abstract* and *practical*; the former comprehends notation, numeration, addition, subtraction, multiplication, division, measures and multiples, fractions, powers and roots: the latter treats of the combinations and practical applications of these and the so-called *rules*, such as reduction, compound addition, subtraction, multiplication, and division; proportion, interest, profit and loss, etc. Another division is *integral* and *fractional* arithmetic, the former treating of integers, or whole numbers, and the latter of frac-

tions. Decimal fractions were invented in the sixteenth century, and logarithms, embodying the last great advance in the science, in the seventeenth century.

Arithmetical (ă-rith-met'i-kal), pertaining to arithmetic or its operations.—*Arithmetical mean*, the middle term of three quantities in arithmetical progression, or half the sum of any two proposed numbers; thus 11 is the arithmetical mean to 8 and 14.—*Arithmetical progression*, a series of numbers increasing or decreasing by a common difference, as 1, 3, 5, 7, etc.—*Arithmetical signs*, certain symbols used in arithmetic, and indicating processes or facts. The common signs used in arithmetic are the following: + signifying that the numbers between which it is placed are to be added; — that the second is to be subtracted from the first; × that the one is to be multiplied by the other; ÷ that the former is to be divided by the latter; = signifies that the one number is equal to the other: : : : : are the signs placed between the members of a proportional serics, as 4 : 6 :: 8 : 12. A small figure placed on the right hand of another at the top signifies the corresponding power of the number beside which it is placed, as 5^2, 4^3, meaning the square of 5 and the cube of 4. $\sqrt{}$ placed before or over a number signifies the square root of that number; with a figure it signifies the root of a higher power, as $\sqrt[3]{}$, which means cube root. A period placed to the left of a series of figures indicates that they are decimal fractions.

A'rius, the originator of the *Arian* heresy. See *Arians.*

Arizona (ăr-i-zō'na), one of the United States of America, bounded south by Mexico, west by California and Nevada (the river Colorado forming the greater part of the boundary), north by Utah, and east by New Mexico; area, 113,956 square miles. The surface is generally mountainous, but many fertile and well-watered valleys lie between the ridges. Part of the surface consists of deserts often entirely destitute of vegetation. The territory belongs to the basin of the Colorado, which passes through a portion of it, besides forming the boundary; while the Gila and Little Colorado, tributaries of the Colorado, traverse it from east to west. The canyons of the Colorado form a wonderful feature, the river flowing for hundreds of miles in a deep rocky channel with walls rising perpendicularly to the height of 1,500 to 6,000 feet. In some parts timber is plentiful. The rainfall is small, and irrigation has been employed for agricultural purposes, most of the streams being used for this purpose, in some cases by the aid of great dams. Regions apparently worthless deserts become highly productive when irrigated. Large tracts of elevated land have been found excellently adapted as pastures for sheep and cattle. Gold, silver, copper and other minerals occur abundantly and the smelting and refining of copper is the largest single industry in the state. The large Portland cement mines at Roosevelt, operated in connection with the Salt River irrigation project, are operated by the U. S. Government. Besides the Roosevelt dam, another great irrigation project is the Yuma project, which will make use of the lower Colorado River and add hundreds of thousands of acres to the agricultural area. The State capital is Phœnix. Arizona was organized as a Territory Feb. 24, 1863; admitted to the Union Feb. 14, 1912

The educational institutions include the University of Arizona, at Tucson (opened, 1891; faculty, 65; students, 700); State Agricultural School at Tucson, and normal schools at Tempe and Flagstaff. Pop. (1900) 122,931; (1910) 204,354; (1920) 333,273.

Ark, the name applied in our translation of the Bible to the boat or floating edifice in which Noah resided during the flood or deluge; to the floating vessel of bulrushes in which the infant Moses was laid; and to the chest in which the tables of the law were preserved—the *ark of the covenant.* This was made of shittim-wood, overlaid within and without with gold, about 3¾ feet long by 2¼ feet high and broad, and over it were placed the golden covering or mercy-seat and the two cherubim. It was placed in the sanctuary of the temple of Solomon; before his time it was kept in the tabernacle, and was moved about as circumstances dictated. At the captivity it appears to have been either lost or destroyed.

Arkansas (ar'kan-sa, French name), one of the United States of America, bounded north by Missouri; east by the Mississippi, which separates it from the States of Mississippi and Tennessee; south by Louisiana and Texas; and west by the States of Oklahoma and Texas; area, 53,335 square miles. The surface in the east is low, flat, and swampy, densely wooded, and subject to frequent inundations from the numerous streams which water it. Towards the center it becomes more diversified, presenting many undulating slopes and hills of moderate elevation. In the west it rises still higher, being traversed by a range of hills called the Ozark, which

ARIZONA
Scale of Miles
0 5 10 20 30 40 50 60 70
Longitude West from Greenwich
115° A 114° B 113° C 112° D 111° E 110° F 109°
37° 36° 35° 34° 33° 32° 31°
UTAH
NEW MEXICO
NEVADA
CALIFORNIA
COLORADO
MEXICO
Colorado R.
San Juan R.
Rio de Chelly
Little Colorado R.
Virgin R.
Virgin Mts.
Grand Wash Cliffs
Diamond Butte
Overton
Littlefield
Leeds
St. George
Wheeler
Bloomington
Mt. Carmel
Glendale
Kanab
Fredonia
Kanab Canon
Vermilion Cliffs
Lee Ferry
Navajo Cr.
Kaibab Plateau
NAVAJO INDIAN RESERVATION
MOQUI INDIAN RESERVATION
Chin Lee
Tuba
Moen Copie Wash
Grand Canon
Cataract Cr.
Coconino
Apex
Anita
Villaba
Valle
Red Lake
Prado
Oraibi
Toreva
Keams Canon
Ganado
Ft. Defiance
St. Michaels
HUALPAI INDIAN RES.
Mt. Tipton
Whitehills
Chloride
Peach Spgs
Nelson
Hackberry
Yampai
Truxton
Crozier
Aubrey
Seligman
Mineral Park
Mineral Pyramid
Berry
Hualapai
Kingman
Cross Mt.
Drake
Hancock
Mohave City
Red Mesa
Williams
Fairview
Supai
Crookton
Cataract Cr.
Asbfork
Meath
Rock Butte
Bill Williams Mt.
Davenport
Greenlaw
Cataract Canon
Black Canon
Blue Ridge
Colorado R.
Needles
Blake
Mellen
Yucca
Haviland
Cedar
Owens
Cedar Glade
Del Rio
Jerome Jc.
Jerome
Cottonwood
Cornville
Cherry
Blackett
Kymo
Ramsgate
Skull Valley
Prescott
McCabe
Poland
Stoneman
Mayer
Middleton
Campverde
Clear Creek
Strawberry
Pine
Payson
Oxbow
Ellison
Heber
Snowflake
Taylor
Pinedale
Shumway
Adair
Showlow
Concho
St. Johns
Richville
Springerville
Eagar
Nutrioso
Greer
Alpine
White Mts.
Whiteriver
Ft. Apache
Signal
Juniper
Date Creek
Hillside
Piedmont
Congress
Martinez
Gilbert
Briggs
Bumble Bee
Turret
Pearl
Rye
Young
Cline
Livingstone
Chloride
Parker
Swansea
Midway
Bouse
Cashion
Wenden
Salome
Harrisburg
Hassayampa
Morristown
Cayecreek
Nada
White Tank Mts.
Quartzsite
Ebrenberg
Chocolate
Cibola
Kofa
Castle Dome Mts.
Agua Caliente
Palomas
Gila Bend
Arlington
Tempe
Mesa
Lehi
Silverking
Higley
Queen Cr.
Alicia
Sacaton
Maricopa
Casagrande
Arizola
Toltec
Picacho
Wymola
Red Rock
Naviska
Rillito
Florence
Dudleyville
Mammoth
Oracle
Redington
Bonita
Ft. Grant
Summit
Solomonville
Bailey's
Wellsville
Eagle Tail Mts.
Gila Mts.
Harquahala Mts.
Salt R.
Salt R. Mts.
Chroms Butte
Gila
Cabrito
Geronimo
Thomas
Metcalf
Clifton
Morenci
Blue
Bryce
Central
Guthrie
Matthews
Arivaipa
Pinal Mts.
Pinal Ranges
Sierra Ancha Mts.
Mogollon Mesa
Winslow
Hobson
Hardy
Joseph City
Holbrook
Woodruff
Adamana
Carrizo
Aztec
Lit. Colorado
Navajo
Chambers
Bibo
Pinto
Allentown
Houck
Querino
Sanders
Canyon Diablo
Dennison
Moqui
Hibbard
Winona
Angel
Cosnino
Flagstaff
Chalender
Kendrick
Humphreys
Agassiz
Fremont
Cliff
Bill Williams
Gila Bend
Sentinel
Painted Rock
Theba
Estrella
Montezuma
Bosque
Aztec
Stanwix
Chrystoval
Kim
Mohawk
Colfred
Tacna
Adonde
Liguria
Blaisdell
Yuma
Arabay
Fortuna
Somerton
Potholes
Colorado
Yuma
Ind.
Gila
Pac.
Sou.
Yokol
Brownell
Quijotoa
Tucson
Silverbell
Range
Tucson
Wilmot
Laurita
Benson
Pantano
Pearce
Johnson
Dragoon
Cochise
Willcox
Dos Cabezos
Pool
Sam Pedro
Rincon
Catalina
Santa Catalina
Rincon
Tanque Verde
Redington
Pantano
Papago Indians
Reciado
Atascos Mts.
Arivaca
Calabasas
Oldglory
Nogales
Patagonia
Charleston
Huachuca
Ft. Huachuca
Sta.
Contention
Fairbank
Turner P.O.
Rosemont
Sonoita
Crittenden
Elgin
Canelo
Sonoita Cr.
Santa Cruz R.
Tubac
Tumacacori
Calabasas
Black Diamond
Glenn
Kelton
Rucker
Rodeo
Chiricahua
Bisbee
Lowell
Naco Jc.
Washington
Lewis Spgs
Loomel
Douglas
Don Luis
Columbus
Lomas Encina
Del Rio
Cananea
Fronteras
Cerro Blanco
Altar R.
Nacozari
Sierra del Aja
Sierra de la Cabeza Prieta
Sierra Pinacate
Gulf of California
Sea of Cortez
Tiburon I.
Angel de la Guarda I.
Ballenas Canal
Salsipuedes Canal
Sta. Rosalia
Guaymas
Hermosillo
Sonora
Pitiquito
Caborca
Sasabe
Nogales
Arizpe
Cumpas
Moctezuma
Nacozari
Agua Prieta
Douglas
Fronteras
Cananea
Cerro Blanco
Altar R.
Sierra del Aja
Sierra de la Cabeza Prieta
Sierra Pinacate
Gulf of California
Sea of Cortez
Tiburon I.
Angel de la Guarda I.
Ballenas Canal
Salsipuedes Canal
Sta. Rosalia
Guaymas
Hermosillo
Sonora
Pitiquito
Caborca
Sasabe
Nogales
Arizpe
Cumpas
Moctezuma
Nacozari
Agua Prieta
Douglas
Fronteras
Cananea
Cerro Blanco
Altar R.

ARKANSAS
Scale of Miles
0 10 20 30 40 50 60 70
C.S. Hammond & Co., N.Y.
MISSOURI
OKLAHOMA
TEXAS
LOUISIANA
MISSISSIPPI
TENN.
LITTLE ROCK
Pinebluff
Arkadelphia
Hot Springs
Mena
Fayetteville
Rogers
Eureka Sprs.
Van Buren
Ft. Smith
Bonanza
Searcy
Conway
Batesville
Newport
Paragould
Jonesboro
Helena
Memphis
Forrest City
Arkansas City
Prescott
Camden
Texarkana
Shreveport
Vicksburg
JACKSON
Longitude West from Greenwich
A B C D E F
94° 93° 92° 91° 90°
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attain a height of 2000 feet, Magazine Mountain rising to 2800. In various parts the prairies are of great extent; the forests also are very magnificent, containing fine specimens, principally of oak, hickory, ash, sycamore, linden, maple, locust and pine. These provide material for the lumber and timber products industry, by far the most important branch of manufactures. The principal rivers, all tributaries of the Mississippi—the Arkansas, the Red River, the White River and the Washita—have been important factors in the industrial development of the State. Mineral springs are abundant. The climate on the whole is mild. The staple products are cotton and corn; fruit is tolerably abundant. The State is rich in minerals, especially coal, which occurs in extensive deposits. Galena and ores of zinc, iron, copper and manganese exist. The valuable mineral bauxite occurs largely and novaculite, or hone-stone, is abundant. Arkansas was colonized as early as 1685 by the French. It was admitted into the Union June 15, 1836. The State capital is Little Rock. Other large towns are Fort Smith, Pine Bluff, Hot Springs. The State takes its name from the Arkansas Indians. The educational institutions include the University of Arkansas, at Fayetteville (founded, 1871; faculty, 80; students, 1044), with a medical school at Little Rock, and an agricultural experiment station; State Normal College at Conway; sectarian colleges at Arkadelphia, Batesville, Conway, Little Rock, etc. Pop. (1900) 1,311,564; (1910) 1,574,449; (1920) 1,750,995.

Arkansas, an affluent of the Mississippi River, 2170 miles. It rises in Colorado, flows through Kansas, Oklahoma and Arkansas.

Arkansas City, a city of Cowley Co., Kansas, at junction of Arkansas and Walnut rivers, 48 miles S. E. of Wichita. It is the distributing and marketing point of a very large area of Kansas and Oklahoma. It lies in a rich agricultural, sand, natural gas, and petroleum region. Principal industries: oil refining, flour milling, gasoline extraction from natural gas, meat packing, foundry and machine shops, and the manufacture of pearl buttons, candy, etc. Pop. (1910) 7508; (1920) 11,253.

Arkwright (ärk'rīt), Sir Richard, famous for his inventions in cotton-spinning, was born at Preston, in Lancashire, in 1732; died 1792. The youngest of thirteen children, he was bred to the trade of a barber. When about thirty-five years of age he gave himself up exclusively to the subject of inventions for spinning cotton. The thread spun by Hargreaves' jenny could not be used except as weft, being destitute of the firmness or hardness required in the longitudinal threads or warp. But Arkwright supplied this deficiency by the invention of the *spinning-frame*, which spins a vast number of threads of any degree of fineness and hardness, leaving the operator merely to feed the machine with cotton and to join the threads when they happen to break. His invention introduced the system of spinning by rollers, the carding, or *roving* as it is technically termed (that is, the soft, loose strip of cotton), passing through one pair of rollers, and being received by a second pair, which are made to revolve with (as the case may be) three, four, or five times the velocity of the first pair. By this contrivance the roving is drawn out into a thread of the desired degree of tenuity and hardness. His inventions being brought into a somewhat advanced state, Arkwright removed to Nottingham in 1768 in order to avoid the attacks of the same lawless rabble that had driven Hargreaves out of Lancashire. Here his operations were at first greatly fettered by a want of capital; but two gentlemen of means having entered into partnership with him, the necessary funds were obtained, and Arkwright erected his first mill, which was driven by horses, at Nottingham, and took out a patent for spinning by rollers in 1769. As the mode of working the machinery by horse-power was found too expensive, he built a second factory on a much larger scale at Cromford, in Derbyshire, in 1771, the machinery of which was turned by a water-wheel. Having made several additional discoveries and improvements in the processes of carding, roving, and spinning, he took out a fresh patent for the whole in 1775, and thus completed a series of the most ingenious and complicated machinery. Notwithstanding a series of lawsuits in defense of his patent rights, and the destruction of his property by mobs, he amassed a large fortune. He was knighted by George III in 1786.

Arlberg (ärl'ber*h*), a branch of the Rhætian Alps, in the west of Tirol, between it and Vorarlberg, pierced by a railway tunnel, one of the longest in the world. It is 6½ miles long, was finished in November, 1883, and connects the valley of the Inn with that of the Rhine, and the Austrian railway system with the Swiss railways.

Arles (ärl; anc. *Arelāte*), a town of Southern France, dep. Bouches du Rhône, 17 miles S. of Nismes. It was an important town at the time of Cæsar's invasion, and under the later

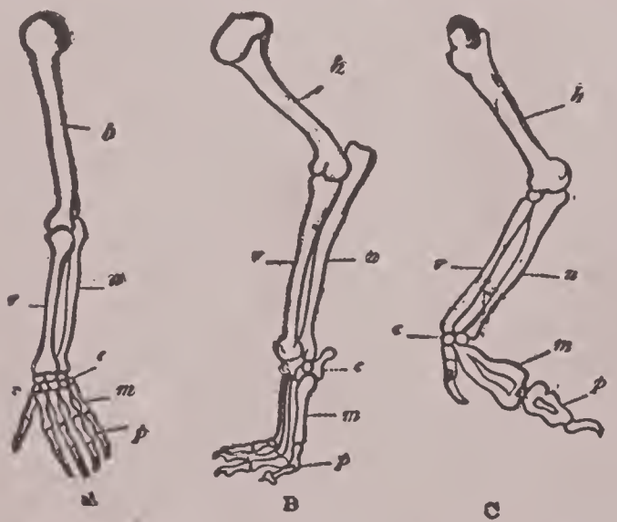
emperors it became one of the most flourishing towns on the further side of the Alps. The chief industry is silk manufacture. Pop. (1906) 16,191.

Arlington (är'ling-tun), HENRY BENNET, EARL OF, member of the Cabal ministry, and one of the scheming creatures of Charles II, born 1618; died 1685. He is supposed to have lived and died a Roman Catholic.

Arlington, a town of Middlesex Co., Massachusetts, on the Boston & Maine R. R., 6 miles N. W. of Boston. A residential town with some manufactures, including piano cases, picture frames, ice tools, etc. Pop. (1910) 11,187; (1920) 18,665.

Arlington a village of Arlington Co., Virginia, opposite Washington, D. C. It was the home of Robert E. Lee, whose Colonial mansion is still preserved. Now a National Cemetery, where are the graves of over 18,000 soldiers.

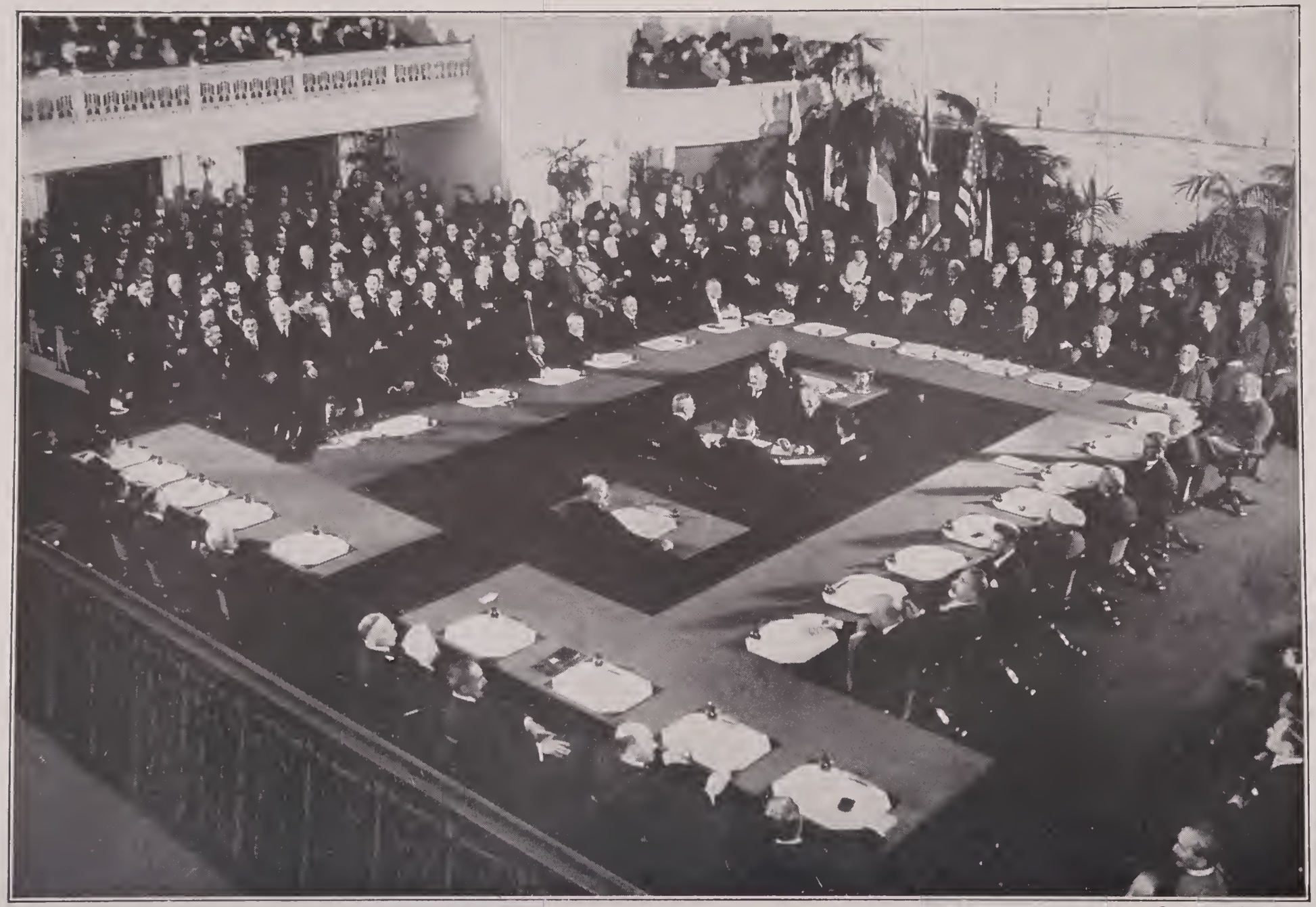
Arm, the upper limb in man, connected with the thorax or chest by means of the scapula or shoulder-blade, and the clavicle or collar-bone. It consists of three bones, the arm-bone (*humĕrus*) and the two bones of the forearm (*radius* and *ulna*), and it is connected with the bones of the hand by the carpus or wrist. The head or upper end of the arm-bone



A, Arm of Man. B, Foreleg of Dog. C, Wing of Bird. *h* Humerus, or bone of upper arm; *r* and *u* Radius and Ulna, or bones of the forearm; *c* Carpus, or bones of the wrist; *m* Metacarpus, or bones of the root of the hand; *p* Phalanges, or bones of the fingers.

fits into the hollow called the *glenoid cavity* of the scapula, so as to form a joint of the ball-and-socket kind, allowing great freedom of movement to the limb. The lower end of the humerus is broadened out by a projection on both the outer and inner sides (the outer and inner *condyles*), and has a pulley-like surface for articulating with the forearm to form the elbow-joint. This joint somewhat resembles a hinge, allowing of movement only in one direction. The ulna is the inner of the two bones of the forearm. It is largest at the upper end, where it has two processes, the *coronoid* and the *olecranon*, with a deep groove between to receive the humerus. The radius —the outer of the two bones—is small at the upper and expanded at the lower end, where it forms part of the wrist-joint. The muscles of the upper arm are either *flexors* or *extensors*, the former serving to bend the arm, the latter to straighten it by means of the elbow-joint. The main flexor is the *biceps*, the large muscle which may be seen standing out in front of the arm when a weight is raised. The chief opposing muscle of the biceps is the *triceps*. The muscles of the forearm are, besides flexors and extensors, *pronators* and *supinators*, the former turning the hand palm downwards, the latter turning it upwards. The same fundamental plan of structure exists in the limbs of all vertebrate animals.

Armada (är-mā'da), the Spanish name for any large naval force; usually applied to the Spanish fleet vaingloriously designated the *Invincible Armada*, intended to act against England A.D. 1588. It was under the command of the Duke of Medina-Sidonia, and consisted of 100 great war vessels, larger and stronger than any belonging to the English fleet, with 30 smaller ships of war, and carried 19,295 marines, 8460 sailors, and was well equipped with guns. It had scarcely quitted Lisbon on May 20, 1588, when it was scattered by a storm, and had to be refitted in Corunna. It was to coöperate with a land force collected in Flanders under the Duke of Parma, and to unite with this it proceeded through the English Channel towards Calais. In its progress it was attacked by the English fleet under Lord Howard, who, with his lieutenants, Drake, Hawkins, and Frobisher, endeavored by dexterous seamanship and the discharge of well-directed volleys of shot to destroy or capture the vessels of the enemy. The great lumbering Spanish vessels suffered severely from their smaller opponents, which most of their shot missed. Arrived at length off Calais, the armada was becalmed, thrown into confusion by fire-ships, and many of the Spanish vessels destroyed or taken. The Duke of Medina-Sidonia, owing to the severe losses, at last resolved to abandon the enterprise, and conceived the idea of reconveying his fleet to Spain by a voyage round the north of Great Britain; but storm after storm assailed his



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THE ARMAMENTS LIMITATION CONFERENCE IN SESSION

This authorized photograph of the memorable Conference which convened in Continental Hall at Washington, in 1921–22, is not intended to bring out the facial expression of the delegates, but to perpetuate the scene itself and show the practical arrangement. At the head of the table (right), reading from the farther corner, are Premier Briand, Senator Underwood, Mr. Root, Senator Lodge, Secretary Hughes (chairman), Mr. Balfour and Lord Lee. At the corner is Ambassador Geddes; down the side, from right to left, are Sir Robert Borden, G. F. Pearce, Sir John Salmond, Mr. Srinivasa Sastri, and other delegates. French and Japanese delegates are at the opposite table. At the extreme left facing Mr. Hughes are the Chinese delegates.

ships, scattering them in all directions, and sinking many. Some went down on the cliffs of Norway, others in the open sea, others on the Scottish coast. About thirty vessels reached the Atlantic Ocean, and of these several were driven on the coast of Ireland and wrecked. In all, seventy-two large vessels and over 10,000 men were lost.

Armadillo (ȧr-ma-dil′lō), an edentate mammal peculiar to South America, consisting of various species, belonging to a family intermediate between the sloths and ant-eaters. They are covered with a hard bony shell, divided into belts, composed of small separate plates like a coat of mail, flexible everywhere except on the forehead, shoulders, and haunches, where it is not movable. The belts are connected by a membrane, which enables the animal to roll itself up like a hedgehog. These animals burrow in the earth, where they lie during the daytime, seldom going abroad except at night. They are of different sizes: the largest *Dasypus gigas*, being 3 feet in length without the tail, and the smallest only 10 inches. They subsist chiefly on fruits and roots, sometimes on insects and flesh. They are inoffensive, and their flesh is esteemed good food.

Armageddon (ȧr-ma-ged′don), the great battlefield of the Old Testament, where the chief conflicts took place between the Israelites and their enemies—the tableland of Esdraelon in Galilee and Samaria, in the center of which stood the town Megiddo, on the site of the modern Lejjun: used figuratively in the Apocalypse to signify the place of 'the battle of that great day of God Almighty.'

Armagh (ȧr-mä′), a county of Ireland, in the province of Ulster; surrounded by Monaghan, Tyrone, Lough Neagh, Down and Louth; area, 312,773 acres. The chief rivers are the Blackwater, Upper-Bann, and Callan. Oats, potatoes, wheat, flax, etc., are grown. The manufacture of linen is carried on extensively. Pop. 120,291.—The county town, ARMAGH, 33 miles S. W. of Belfast, has Protestant and Catholic cathedrals and various public buildings. It is the seat of the see of the Primate of all Ireland, in the Anglican and Catholic churches. Armagh is said to have been founded by St. Patrick in the 5th century and was the metropolis of Ireland from 495 to the 9th century. Pop. 7356.

Armagnac (ȧr-mȧ-nyȧk), an ancient territory of Gascony, France, now mostly in dept. of Gers. The Counts of Armagnac held prominent places in the history of France. Bernard VII, son of John II, surnamed the Hunchback, succeeded his brother, John III, in 1391, and was called to court by Isabella of Bavaria. Becoming Constable of France, he showed himself a merciless tyrant, and became so generally execrated that the Duke of Burgundy, to whom Isabella had turned for help, found little difficulty in gaining admission into Paris, and even seizing the person of Armagnac, who was cast into prison in 1418, when the exasperated populace burst in and killed him and his followers. John V, grandson of the above, who succeeded in 1450, made himself notorious for his crimes. He was assassinated in his castle of Lectoure in 1473 by an agent of Louis XI, against whom he was holding out.

Armaments' Limitation Conference, a conference of the principal naval Powers of the world, which convened at Washington in November, 1921, on the invitation of President Harding to discuss (1) the limitation of naval armaments; (2) questions relating to the Far East. (China, Japan, Russia, Siberia); (3) questions relating to the Pacific and mandated islands. The matter of land armaments was also on the agenda. The American delegates were Secretary of State Hughes; Senators Underwood and Lodge; and Elihu Root. The British delegates were A. J. Balfour, Lord Lee, Sir R. Borden, G. F. Pearce, Srinavasa Sastri, Sir J. W. Salmond. Sir Auckland Geddes acted as alternate in the absence of Premier George. Japan sent Prince Tokugawa, Baron Shidehara, and Hanihara. France, Italy, Belgium, Netherlands were also represented. The Naval treaty, signed by five powers, provided for the scrapping of many ships, a ten years' building holiday, and the limitation of capital ships to a ratio of 5, 5, 3, 1.75, 1.75, with limit of tonnage as follows: United States, 525,000; Britain, 525,000; Japan, 315,000; France, 175,000; Italy, 175,000. Submarines are not to be used as commerce destroyers. Poison gas warfare is outlawed. Rights in the insular possessions of the U. S., Britain, France and Japan are to be mutually respected (this abrogates the British-Japanese alliance). The open door in China is to be maintained. Chinese integrity is to be respected. Kiaochow to be restored to China.

Armatoles (ȧr-ma-tō′lēs), the warlike inhabitants of the mountain districts of Northern Greece. They have dwelt there since the 15th century, at one time ravaging the lower country as robbers, at another protecting the inhabitants from other robbers in

consideration of blackmail. The Turks, unable to subdue them, finally made terms with them, and converted them into a sort of rural police. They hated the Turkish rule, nominal as it was, and joined the Greeks, 12,000 strong, in the insurrection of 1820, gaining some degree of glory in the war of independence.

Armature (ar'ma-tūr), a term applied to the piece of soft iron which is placed across the poles of permanent or electro-magnets for the purpose of receiving and concentrating the attractive force. In the case of permanent magnets it is also important for preserving their magnetism when not in use, and hence it is sometimes termed the *keeper*. It produces this effect in virtue of the well-known law of induction, by which the armature, when placed near or across the poles of the magnet, is itself converted into a temporary magnet with reversed poles, and these, reacting upon the permanent magnet, keep its particles in a state of constant magnetic tension, or, in other words, in that constrained position which is supposed to constitute magnetism. A horseshoe magnet should therefore never be laid aside without its armature; and in the case of straight bar-magnets two should be placed parallel to each other, with their poles reversed, and a keeper or armature across them at both ends. The term is also applied to the core and coil of the electro-magnet, which revolves before the poles of the permanent magnet in the magneto-electric machine.

Armenia (ar-mē'ni-a), a mountainous country of Western Asia, not now politically existing, but of great historical interest, as the original seat of one of the oldest civilized peoples in the world. It is now shared between Turkey, Persia, and Russia. It has an area of about 137,000 square miles, and is intersected by the Euphrates, which divided it into the ancient Armenia Major and Armenia Minor. The country is an elevated plateau, inclosed on several sides by the ranges of Taurus and Anti-Taurus, and partly occupied by other mountains, the loftiest of which is Ararat. Several important rivers take their rise in Armenia, namely, the Kur or Cyrus, and its tributary the Aras or Araxes, flowing east to the Caspian Sea; the Halys or Kizil-Irmak, flowing north to the Black Sea; and the Tigris and Euphrates, which flow into the Persian Gulf. The chief lakes are Van and Urumiyah. The climate is rather severe. The soil is on the whole productive, though in many places it would be quite barren were it not for the great care taken to irrigate it. Wheat, barley, tobacco, hemp, grapes, and cotton are raised; and in some of the valleys apricots, peaches, mulberries, and walnuts are grown. The inhabitants are chiefly of the genuine Armenian stock, a branch of the Aryan or Indo-European race; but besides them, in consequence of the repeated subjugation of the country, various other races have obtained a footing. The total number of Armenians is estimated at 2,000,000, of whom probably one-half are in Armenia. The remainder, like the Jews, are scattered over various countries, and being strongly addicted to commerce, play an important part as merchants. They retain, however, in their different colonies their distinct nationality.

Little is known of the early history of Armenia, but it was a separate State as early as the eighth century B.C., when it became subject to Assyria, as it also did subsequently to the Medes and the Persians. It was conquered by Alexander the Great in 325 B.C., but regained its independence about 190 B.C. Its king, Tigranes, son-in-law of the celebrated Mithridātes, was defeated by the Romans under Lucullus and Pompey about 69–66 B.C., but was left on the throne. Since then its fortunes have been various under the Romans, Parthians, Byzantine emperors, Persians, Saracens, Turks, etc. A considerable portion of it has been acquired by Russia in the present century; part of this in 1878.

The Armenians received Christianity as early as the second century. During the Monophysitic disputes they held with those who rejected the two-fold nature of Christ, and being dissatisfied with the decisions of the Council of Chalcedon (451) they separated from the Greek Church in 536. The popes have at different times attempted to gain them over to the Roman Catholic faith, but have not been able to unite them permanently and generally with the Roman Church. There are, however, small numbers here and there of United Armenians, who acknowledge the spiritual supremacy of the pope, agree in their doctrines with the Catholics, but retain their peculiar ceremonies and discipline. But the far greater part are yet Monophysites, and have remained faithful to their old religion and worship. Their doctrine differs from the orthodox chiefly in their admitting only one nature in Christ, and believing the Holy Spirit to proceed from the Father alone. Their sacraments are seven in number. They adore saints and their images, but do not believe in purgatory. Their hierarchy differs little from that of the Greeks. The *Catholicus*, or

head of the church, has his seat at Etchmiadzin, a monastery near Erivan, the capital of Russian Aremenia, on Mount Ararat.

The Armenian language belongs to the Indo-European family of languages, and is most closely connected with the Iranic group. The Old Armenian language differs from the modern, which contains a large intermixture of Persian and Turkish elements. The Armenian Bible, translated from the Septuagint by Isaac or Sahak, the patriarch, early in the fifth century, is a model of the classic style.

In 1896 efforts were made towards ameliorating the condition of the Armenians, which, under the oppression of their Turkish rulers, both political and religious, had become unendurable. Massacres had occurred in many places, by which thousands of the Armenians were put to death with terrible cruelty.

During the year 1915 the civilized world was shocked by reports of atrocities. About half the population had been murdered or driven to certain death in the desert from March to October.

Armentières (ar-mân-tyār), a town in France, dep. Nord, 10 miles W. N. W. of Lille, on the Lys. The town has extensive manufactures of linen and cotton goods and an extensive trade. Pop. (1906) 25,408.

Armfelt (ärm'felt), GUSTAV MORITZ, COUNT OF, Swedish soldier; born in 1757; died in 1814. Though he had been highly favored and loaded with honors by Gustavus III, he incurred the enmity of the Duke of Sudermania, guardian to the young king, Gustavus IV, and was deprived of all his titles and possessions. He was restored to his fortune and honors in 1799, when Gustavus IV attained his majority, and held several high military posts. Ultimately, however, he entered the Russian service. was made count, chancellor of the University of Abo, president of the department for the affairs of Finland, member of the Russian senate, and served in the campaign against Napoleon in 1812.

Armida (ar-mē'dà), a beautiful enchantress in Tasso's *Jerusalem Delivered*, who succeeds in bringing the hero, Rinaldo, with whom she had fallen violently in love, to her enchanted gardens. Here he completely forgets the high task to which he had devoted himself, until messengers from the Christian host having arrived at the island, Rinaldo escapes with them by means of a powerful talisman. In the sequel Armida becomes a Christian.

Armillary (ar'mi-lar-i) SPHERE (L. *armilla*, a hoop), an astronomical instrument consisting of an arrangement of rings, all circles of one sphere, intended to represent the principal circles of the celestial globe, the rings standing for the meridian of the station, the ecliptic, the tropics, the Arctic and Antartic circles, etc., in their relative positions. Its main use is to give a representation of the apparent motions of the solar system.

Arminians (ar-min'i-ans), a sect or party of Christians, so-called from James *Arminius* or Harmensen, a Protestant divine of Leyden, who died in 1609. They were called also *Remonstrants*, from their having presented a *remonstrance* to the States-general in 1610. The Arminian doctrines are: (1) Conditional election and reprobation, in opposition to absolute predestination. (2) Universal redemption, or that the atonement was made by Christ for all mankind, though none but believers can be partakers of the benefit. (3) That man, in order to exercise true faith, must be regenerated and renewed by the operation of the Holy Spirit, which is the gift of God; but that this grace is not irresistible and may be lost, so that men may relapse from a state of grace and die in their sins. These doctrines were vehemently attacked by the Calvanists of Holland, and were condemned by the Synod of Dort in 1619. The Arminians in consequence were treated with great severity; many of them fled to, and spread in, other countries, and though there is no longer any particular sect to which the name is exclusively applied, many bodies are classed as Arminians, as being opposed to the Calvinists on the question of predestination.

Arminius (ar-min'i-us), an ancient German hero celebrated by his fellow-countrymen as their deliverer from the Roman yoke; born about 18–16 B.C., assassinated A.D. 19. Having been sent as a hostage to Rome, he served in the Roman army, and was raised to the rank of *eques*. Returning home he found the Roman governor, Quintilius Varus, making efforts to Romanize the German tribes near the Rhine. Placing himself at the head of the discontented tribes he completely annihilated the army of Varus, consisting of three legions, in a three days' battle fought in the Teutoburg forest. For some time he baffled the Roman general Germanicus, and after many years' resistance to the vast power of the empire he drew upon himself the hatred of his countrymen by aiming at the regal authority, and was assassinated. A national monument to his memory was

inaugurated on the Grotenburg, near Detmold, in 1875.

Arminius, JACOBUS (properly JAKOB HARMENSEN), founder of the sect of Arminians or Remonstrants, was born in South Holland in 1560; died 1609. He studied at Utrecht, in the University of Leyden, and at Geneva, where his chief preceptor in theology was Theodore Beza (1582). On his return to Holland he was appointed minister of one of the churches in Amsterdam, and chosen to undertake the refutation of a work which strongly controverted Beza's doctrine of predestination; but he happened to be convinced by the work which he had undertaken to refute. Elected in 1603 professor of divinity at Leyden, he openly declared his opinions, and was involved in harassing controversies, especially with his fellow-professor, Gomarus. These contests, with the continual attacks on his reputation, at length impaired his health and brought on a complicated disease, of which he died. See *Arminians.*

Armistice (ar'mis-tis), a temporary suspension of hostilities between two belligerent powers or two armies by mutual agreement, often concluded for only a few hours to bury the slain, remove the wounded, and exchange prisoners, as also sometimes to allow of a parley between the opposing generals. A general armistice is usually the preliminary of a peace.

Armistice Day, November 11th, a national holiday in several countries, dating from November 11, 1918, when Germany and the Allies signed the armistice bringing to an end the World War (1914-18). On Armistice Day, 1921, the body of an unknown American soldier, brought from France, was buried at Arlington National Cemetery—symbolically honored for the 77,118 Americans, including himself, who fell on foreign soil in the World War. Representatives of many nations were present at the ceremonial. On the same day began the Armaments' Limitation Conference (q. v.).

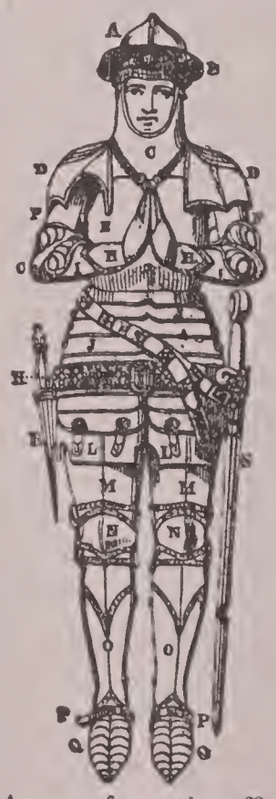
Armor-plates, iron or steel plates with which the sides of vessels of war are covered with the view of rendering them shot-proof. See *Iron-clad Vessels.*

Arms, COAT OF, or ARMORIAL BEARINGS, a collective name for the devices borne on shields, or banners, etc., as marks of dignity and distinction, and, in the case of family and feudal arms, descending from father to son. They were first employed by the Crusaders, and become hereditary in families at or near the close of the 12th century. They took their rise from the knights painting their banners or shields each with a figure or figures proper to himself, to enable him to be distinguished in battle when clad in armor. See *Heraldry.*

Arms, COLLEGE OF. See *Herald.*

Arms, STAND OF, the set of arms necessary for the equipment of a single soldier.

Arms and Armor. The former term is applied to weapons of offense, the latter to the various articles of defensive covering used in war and military exercises, especially before the introduction of gunpowder. Weapons of offense are divisible into two distinct sections—firearms, and arms used without gunpowder or other explosive substance. The first arms of offense would probably be wooden clubs, then would follow wooden weapons made more deadly by means of stone or bone, then stone axes, slings, bows and arrows with heads of flint or bone, and afterwards various weapons of bronze. Subsequently a variety of arms of iron and steel were introduced, which comprised the sword, javelin, pike, spear or lance, dagger, axe, mace, chariot scythe, etc.; with a rude artillery consisting of catapults, ballistæ, and battering-rams. From the descriptions of Homer we know that almost all the Grecian armor, defensive and offensive, in his time was of bronze; though iron was sometimes used.



A, Bascinet.
B, Jewelled orle round the bascinet.
C, Gorget, or gorgiere of plate.
D, Pauldrons.
E, Breastplate-cuirass.
F, Rere-braces.
G, Coudes or elbow-plates.
H, Gauntlets.
I, Vambrace.
J, Skirt of taces.
K, Military belt or cingulum, richly jeweled.
L, Tuilles or tuillets.
M, Cuisses.
N, Genouilleres or knee-pieces.
O, Jambes.
P, Spur-straps.
Q, Sollerets.
R, Misericorde or dagger.
S, Sword, suspended by a transverse belt.

Armor, from the effigy of Sir Richard Peyton, in Tong Church, Shropshire.

The lance, spear, and javelin were the principal weapons of this age among the Greeks. The bow is not often mentioned. Among ancient nations the Egyptians seem to have been most accustomed to the use of the bow, which was the principal projectile weapon of the Egyptian infantry. Peculiar to the Egyptians was a defensive weapon intended to catch and break the sword of the enemy. With the Assyrians the bow was a favorite weapon; but with them lances, spears, and javelins were in more common use than with the Egyptians. Most of the large engines of war, chariots with scythes projecting at each side from the axle, catapults, and ballistæ, seem to have been of Assyrian origin. During the historical age of Greece the characteristic weapon was a heavy spear from 18 to 24 feet in length. The sword used by the Greeks was short, and was worn on the right side. The Roman sword was from 22 to 24 inches in length, straight, two-edged, and obtusely pointed, and as by the Greeks was worn on the right side. It was used principally as a stabbing weapon. It was originally of bronze. The most characteristic weapon of the Roman legionary soldier, however, was the *pilum*, which was a kind of pike or javelin, some 6 feet or more in length. The pilum was sometimes used at close quarters, but more commonly it was thrown. The favorite weapons of the ancient Germanic races were the battle-axe, the lance or dart, and the sword. The weapons of the Anglo-Saxons were spears, axes, swords, knives, and maces or clubs. The Normans had similar weapons, and were well furnished with archers and cavalry. The cross-bow was a comparatively late invention introduced by the Normans. Gunpowder was not used in Europe to discharge projectiles till the beginning of the fourteenth century. Cannon are first mentioned in England in 1338, and there seems to be no doubt that they were used by the English at the siege of Cambrai in 1339. The projectiles first used for cannon were of stone. Hand firearms date from about the 14th century. At first they required two men to serve them, and it was necessary to rest the muzzle on a stand in aiming and firing. The first improvement was the invention of the match-lock, about 1476; this was followed by the wheel-lock, and about the middle of the seventeenth century by the flint-lock, which was in universal use until it was superseded by the percussion-lock, the invention of a Scotch clergyman early in the nineteenth century. The needle-gun dates from 1827. Since that date a great many improvements have been made, including the magazine rifle and the machine gun, while the power of cannons has enormously increased. The only important weapon not a firearm that has been invented since the introduction of gunpowder is the bayonet, which is believed to have been invented about 1650. See *Cannon*, *Musket*, *Rifle*, etc.

Roman Cuirass.

Greek Armor.

Roman Cuirass—Scale armor.

Chain Armor.

Some kind of defensive covering was probably of almost as early invention as weapons of offense. The principal pieces of defensive armor used by the ancients were shields, helmets, cuirasses, and greaves. In the earliest ages of Greece the shield is described as of immense size, but in the time of the Peloponnesian war (about B.C. 420) it was much smaller. The Romans had two sorts of shields; the *scutum*, a large oblong rectangular highly convex shield, carried by the legionaries; and the *parma*, a small round or oval flat shield, carried by the light-armed troops and the cavalry. In the declining days of Rome the shields became larger and more varied in form. The helmet was a characteristic piece of armor among the Assyrians, Greeks, Etruscans,

and Romans. Like all other body armor, it was usually made of bronze. The helmet of the historical age of Greece was distinguished by its lofty crest. The Roman helmet in the time of the early emperors fitted close to the head, and had a neckguard and hinged cheek-pieces fastened under the chin, and a small bar across the face for a visor. Both Greeks and Romans wore cuirasses, at one time of bronze, but latterly of flexible materials. Greaves for the legs were worn by both, but among the Romans usually on one leg. The ancient Germans had large shields of plaited osier covered with leather; afterwards their shields were small, bound with iron, and studded with bosses. The Anglo-Saxons had round or oval shields of wood, covered with leather, and having a boss in the center; and they had also corselets, or coats of mail, strengthened with iron rings. The Normans were well protected by mail; their shields were somewhat triangular in shape, their helmets conical. In Europe generally metal armor was used from the tenth to the eighteenth century, and at first consisted of a tunic made of iron rings firmly sewn flat upon strong cloth or leather. The rings were afterwards interlinked one with another so as to form a garment of themselves, called *chain-mail.* Great variety is found in the pattern of the armor, and in some cases small pieces of metal were used instead of rings, forming what is called *scale-armor.* A suit of armor consisting of larger pieces of metal, called *plate-armor*, was now introduced, and the whole body came to be incased in a heavy metal covering. The various forms of ring or scale-armor were

Horse-armor of Maximilian I of Germany.

a, Chamfron. *b*, Manefaire. *c*, Poitrinal, poitrel, or breastplate. *d*, Croupiere or buttock-piece.

gradually superseded by the plate-armor, which continued to be worn until long after the introduction of firearms and field artillery. A complete suit of armor was an elaborate and costly equipment, consisting of a number of different pieces, each with its distinctive name. In modern European armies the metal cuirass is still to some extent in use, the *cuirassiers* being heavy cavalry; and it is said that this piece of armor proves a useful defense against rifle bullets. During all the time that the use of heavy armor prevailed, the horsemen, who alone were fully armed, formed the principal strength of armies; and infantry were generally regarded as of hardly any account. England was, however, an exception, as the English archers were almost at all times, before the invention of gunpowder, an important and sometimes the chief force in the army. The bow (*long-bow*) of the English archers was from 5 to 6 feet in length, and the arrow discharged from it was itself a yard long. The long-bow continued in general use in England till the end of the reign of Elizabeth, and even as late as 1627 there was a body of English archers in the pay of Richelieu at the siege of La Rochelle.

Allecret (Light Plate) Armor, A.D. 1540.

Armstrong (arm'strang), JOHN, Scottish poet and physician, born about 1709; died 1779. After studying medicine in Edinburgh he settled in London. In 1744 he published his chief work, the *Art of Preserving Health*, a didactic poem. This work raised his reputation to a height which his subsequent efforts scarcely sustained. His later works comprised *Miscellanies* (of no value), *Medical Essays*, and a work of travel named *Launcelot Temple.*

Armstrong (arm'strang), SAMUEL CHAPMAN, educator, born in 1839 in the Hawaiian Islands, the son of a missionary. He graduated at Williams College in 1862, entered the army as a captain, and in 1863 was made lieutenant-colonel in the 9th U. S. colored infantry. He left the service in 1865 as brevet brigadier-general and was put in charge of the Freedman's Bureau station at Hampton, Va. In 1868 he opened the Hampton Normal and Agricultural Institute for negroes, Indians being subsequently admitted. Here he remained until his death in 1893, working among

his colored wards with the greatest devotion and the highest success.

Arm'strong, WILLIAM GEORGE, LORD, engineer and mechanical inventor, born at Newcastle-on-Tyne, 26th Nov., 1810. He was trained as a solicitor, and practised as such for some time, though his tastes scarcely lay in that direction. Among his early inventions were the hydro-electric machine, a powerful apparatus for producing frictional electricity, and the hydraulic crane. In 1846 the Elswick works, near Newcastle, were established for the manufacture of his cranes and other heavy iron machinery, and these works are now among the most extensive of their kind. Here the first rifled ordnance gun which bears his name was made in 1854. (See next article.) His improvements in the manufacture of guns and shells led to his being appointed engineer of rifled ordnance under government, and he was knighted in 1858. This appointment came to an end in 1863, since which time his ordnance has taken a prominent place in the armaments of different countries. He was raised to the peerage as Baron Armstrong in 1887. Died Dec., 1900.

Armstrong Gun, a kind of cannon, so called from its inventor (see the preceding article), made of wrought-iron, principally of spirally-coiled bars so disposed as to bring the metal into the most favorable position for the strain to which it is to be exposed, and occasionally having an inner tube or core of steel, rifled with numerous shallow grooves. The size of these guns ranges from the smallest field-piece to pieces of the highest caliber. The projectile is coated with lead, and inserted into a chamber behind the bore. This the explosion drives forward, compressing its soft coating into the grooves, so as to give it a rotary motion and at the same time obviate windage. Both breech-loading and muzzle-loading Armstrong guns are made.

Ar'my, a collection or body of men armed for war, and organized in companies, battalions, r giments, brigades, or similar divisions, under proper officers. Ancient armies from the time of Rameses II (Sesostris) of Egypt downwards, underwent a series of progressive improvements under the Assyrians, Persians, Greeks, and Carthaginians, till they reached a high degree of perfection under the Romans. In Rome every citizen from the age of seventeen to forty-six was bound to serve in the army. Under the republic a levy took place every year soon after the election of the consuls. It was superintended by the military tribunes, who at once formed the new levies into legions. (See *Legion.*) Under the empire a standing army was required for maintenance of order in the interior and the defense of the frontiers. In the reign of Augustus the strength of this army reached 450,000 men. The earliest military system of the Teutonic races consisted of the armed freemen, ruled by elected leaders, but even then there was a personal following or bodyguard of the king or leader. Among the countries of modern Europe the foundation of a standing army was first laid in France. Charles VII of France issued an ordinance for the creation of a number of troops of horse, and a corresponding body of infantry, the whole force amounting to 25,000 men. The superiority of such a body over an assemblage of feudal troops was soon proved, and other States imitated the example of France. By the beginning of the sixteenth century France, Germany, and Spain were all in possession of considerable standing armies. Since the middle of the eighteenth century a great change has taken place in the composition of armies through the reintroduction of the principle of the universal liability of all men capable of bearing arms in military service, or, in other words, through the raising of armies by a general conscription, which is now done in every European country.

Army of the United States. The first regular army was established by an Act of Congress passed on September 29, 1789. It provided an establishment of 700, and from this beginning has evolved, through numerous changes, the army authorized by Act of Congress of June 3, 1916. Like the army of Great Britain, that of the United States is recruited by voluntary enlistment, a system that has sufficed to produce a powerful defensive force in time of peril and under which it has been found feasible to carry on war outside of the United States, until the outbreak of the great war in which the great military powers of the Teutonic Allies have laid under contribution the man-power of their opponents to the extremest degree. The chief occasions in which the country has had to extend the enlistments may be recalled. In the War of 1812-15, about 580,000 men were brought under arms; in the Mexican War, 1846-48, about 112,000; in the Civil War, 2,780,000; in the Spanish, 1898, 313,000; in the Philippine Rebellion, 140,000; and to the Allied forces in China on the occasion of the 'Boxer Rebellion,' in 1900, 6983.

At the close of the revolution the Army of the United States was fixed at one regi-

ment of infantry of twelve companies, and one regiment of artillery of four companies, a total of 1216 officers and men. In 1791 an additional infantry regiment of 900 men was authorized. In 1798 a force of 10,000 men was raised, but was disbanded in 1800. In 1846 the army contained 7000 men. At the outbreak of the Civil War the army had a line strength of 12,931 officers and men. In 1876 Congress fixed the maximum strength of the regular army at 25,000 enlisted men. In 1893 there were 28,000 men in the army.

The actual strength of the army on June 30, 1912, was: Regular Army and Porto Rico regiment 4470 officers and 81,331 rank and file and others. In addition was the militia forces comprised of 9142 officers and 112,710 enlisted men, an effective strength increased in 1913 to 120,800. The organization of the militia, or National Guard, was under control of the States, enlistment was voluntary, and service in camp was of short duration. The different State Governors were the commanders-in-chief of the force enrolled in the respective States. Their service could be required by the President only in case of emergency, when they passed under control of the President and the officers appointed by him. In 1913, the maximum strength of the army was fixed at 100,000, and the units of organization were: 15 regiments of cavalry; 6 of field artillery; 1 corps of coast artillery; 3 battalions of engineers; 30 regiments of infantry; the Porto Rico regiment, and various staff corps and detachments.

The Act of 1916 provided for an increase of the Regular Army from a peace strength of about 100,000 to one of about 208,000. This increment, however, was to be effected by five annual additions, so that the total authorized force should not be raised till June 30, 1920. It was to comprise "the Regular Army, the Volunteer Army, the Officers' Reserve Corps, the Enlisted Reserve Corps, the National Guard while in the service of the United States, and such other land forces as are now or may hereafter be authorized by law."

The Regular Army consists of 64 regiments of infantry; 25 of cavalry; 21 of field artillery; the Coast Artillery Corps; the brigade division, army corps, and army headquarters, with their detachments and troops; General Staff Corps; Adjutant-General's Department; Inspector-General's Department; Judge-Advocate General's Department; Quartermaster Corps; Medical Department; Corps of Engineers; Ordnance Department; Signal Corps; the officers of the Bureau of Insular Affairs; the Militia Bureau; the detached officers; the detached non-commissioned officers; the professors; the Corps of Cadets; the general army service detachment, and the detachments of cavalry, field artillery, and engineers, and the band of the United States Military Academy; the post non-commissioned staff officers; the recruiting parties; the recruit depot detachments, and unassigned recruits; the service school detachments; the disciplinary guards; the disciplinary organizations; the Indian Scouts, and such other officers and enlisted men as might later be provided for.

Soon after the United States declared war on Germany in 1917 provision was made for an enormous increase of the military forces of the nation, approximating the hitherto unheard-of total of some 3,000,000 men. It was to consist of three parts unified for the purposes of the war. The first was the Regular Army, which was to be increased by voluntary enlistment from less than 100,000 to 300,000 men. The second part consisted of the National Guard, or State militia regiments, which lost their identity and their numerical designations as State organizations and became 'Nationalized.' The increase of the National Guard (16 divisions) authorized a total of 450,000 men. In August over 300,000 'Nationalized' National Guardsmen were in training camps throughout the United States. The third part of the military establishment was the so-called 'National Army,' composed of conscripts, men chosen by a 'selective draft.' The Emergency Army Law, which was approved May 18, 1917, provided for the registration on June 5 of all men in the country between the ages of 21 and 31. The total registered was 9,780,685, of which 1,275,902 were aliens and 80,538 alien enemies. On July 20, out of those registered, 687,000 were drafted by lot to provide the first 500,000 men of the new army. The second selective service legislation embraced all male citizens between the ages of 18 and 45, not included in the first draft. Over 13,000,000 men enrolled on September 12, 1918. The grand total of registrants in both drafts was 23,456,021. The government's plan was to have approximately 5,000,000 men under arms before the summer of 1919. The German armistice on November 11, 1918, found 4,000,000 Americans actually under arms.

The conscript army was designated as the 'National Army,' to distinguish it from the Regular Army. It was largely officered by graduates of Reserve Officers' Training Camps, of which a series were held in various parts of the country, the course lasting three months for its principal branches of the service, although in

special branches, such as aviation, the course was extended to a longer period. At the end of the training period successful candidates were granted commissions in accordance with their fitness to command and either assigned to duty or held in reserve. The training of the National Army proceeded rapidly under these officers, with experienced Regular Army officers in the higher commands, in huge army cantonments holding forty or fifty thousand men, in some cases, and as the training was completed (in about three months' time) selected contingents were sent abroad for final intensive training before entering upon active service.

In July, 1918, the War Department dropped the classification of Regulars, National Army and National Guard units. From that time all forces at home and abroad were designated solely as numerical units of the United States Army. During the great war with Germany and Austria-Hungary, 1917-18 (see *European war*), General Peyton C. March, as chief of staff, was in command of the Army of the United States, ranking General John J. Pershing, commander of the American forces in France, and General Bliss, who was America's military representative in the Council of Versailles. Lieut.-Gen. Liggett was in command of the First Army; Lieut.-Gen. Bullard commanded the Second Army. Among the corps commanders were Major-Generals Read, Cameron, Dickman, Summerall. Hines, Bundy and Wright.

The President is the constitutional commander-in-chief of the Army. The Secretary of War is responsible for the administration of the War Department, and the execution of the military policy of the President. The Chief of Staff is the technical military adviser of the Secretary of War and through him pass all orders between the War Department and the army. Similarly, he supervises the training and discipline of the troops of the line and co-ordinates the work of the different Staff Corps and departments. The duties of the General Staff include the preparation of plans for national defense and for mobilization in time of war.

Army Corps, one of the largest divisions of an army in the field, comprising all arms, and commanded by a general officer; subdivided into divisions, which may or may not comprise all arms.

Army Worm, the very destructive larva of the moth *Heliophila* or *Leucania unipuncta,* so called from its habit of marching in compact bodies of enormous number, devouring almost every green thing it meets. The parent moth is dark-colored. The larva is about 1½ inches long and is found in various parts of the world, but is particularly destructive in North America. The larva of *Sciara militaris,* a European two-winged fly, is also called army worm. Scattering poison bran mash through infected fields is considered the best method of dealing with this plague.

Arnatto, or ANNOTTA. See *Annatto.*

Arnaud (är-nō), HENRI, pastor and military leader of the Vaudois of Piedmont; born 1641; died 1721. At the head of his people he successfully withstood the united forces of France and Savoy, and afterwards did good service against France in the war of the Spanish Succession. He had to retire from his country, and was followed by a number of his people, to whom he discharged the duties of pastor till his death.

Arnauld (är-nō), the name of a French family, several members of which greatly distinguished themselves.—ANTOINE, an eminent French advocate, was born 1560; died 1619. Distinguished as a zealous defender of the cause of Henry IV and for his powerful and successful defense of the University of Paris against the Jesuits in 1594. His family formed the nucleus of the sect of the Jansenists (see *Jansenius*) in France. —His son ANTOINE, called the *Great Arnauld,* was born February 6, 1612, at Paris; died August 9, 1694, at Brussels. He devoted himself to theology, and was received in 1641 among the doctors of the Sorbonne. He engaged in all the quarrels of the French Jansenists with the Jesuits, the clergy, and the government, was the chief Jansenist writer, and was considered their head. Excluded from the Sorbonne, he retired to Port Royal, where he wrote, in conjunction with his friend Nicole, a celebrated system of logic (hence called the Port Royal Logic). On account of persecution he fled, in 1679, to the Netherlands. His works, which are mainly controversies with the Jesuits or the Calvinists, are very voluminous.—His brother ROBERT, born 1588, died 1674, was a person of influence at the French court, but latterly retired to Port Royal, where he wrote a translation of Josephus and other works. Robert's daughter, ANGÉLIQUE, born 1624, died 1684, was eminent in the religious world, and was subject to persecution on account of her unflinching adherence to Jansenism.

Arnauts. See *Albania.*

Arndt (ärnt), ERNST MORITZ, a German patriot and poet; was born 1769; died 1860. He was appointed professor of history at Greifswald in 1806, and stirred up the national feeling against Napoleon in his work *Geist der Zeit*

('Spirit of the Time'). In 1812–13 he zealously promoted the war of independence by a number of pamphlets, poems, and spirited songs, among which it is sufficient to refer to his *Was ist das Deutschen Vaterland? Der Gott, der Eisen wachsen liess*, and *Was blasen die Trompeten? Husaren heraus!* which were caught up and sung from one end of Germany to the other. In 1817 he married a sister of the theologian Schleiermacher, and settled at Bonn in order to undertake the duties of professor of history. He was, however, suspended till 1840 on account of his liberal opinions, when he was restored to his chair on the accession of Frederick William IV.

Arndt, JOHANN, celebrated German mystic theologian; born 1555; died 1621. His principal work, *Wahres Christenthum* ('True Christianity'), is still popular in Germany, and has been translated into almost all European languages.

Arne (ârn), THOMAS AUGUSTINE, English composer; born at London 1710; died 1778. His first opera, *Rosamond*, was performed in 1733 at Lincoln's Inn Fields, and was received with great applause. Then followed Fielding's comic opera, *Tom Thumb*, or the *Tragedy of Tragedies*. His style in the *Comus* (1738) is still more original and cultivated. To him we owe the national air *Rule Britannia*, originally given in a popular piece called the *Masque of Alfred*. After having composed two oratorios and several operas he received the title of Doctor of Music at Oxford. He composed, also, music for several of the songs in Shakespere's dramas, and various pieces of instrumental music.

Arnee (ar-nē'), one of the numerous Indian varieties of the buffalo (*Bubălus arni*), remarkable as being the largest animal of the ox kind known. It measures about 7 feet high at the shoulders, and from 9 to 10½ feet long from the muzzle to the root of the tail. It is found chiefly in the forests at the base of the Himalayas.

Arnhem, or ARNHEIM (arn'hīm), a town in Holland, prov. of Gelderland, 18 miles southwest of Zutphen, on the right bank of the Rhine. Pleasantly situated, it is a favorite residential resort, and it contains many interesting public buildings; manufactures cabinet wares, mirrors, carriages, mathematical instruments, etc.; has paper mills, and its trade is important. In 1795 it was stormed by the French, who were driven from it by the Prussians in 1813. Pop. 56,812.

Arnhem Land, a portion of the northern territory of S. Australia, lying west of the Gulf of Carpentaria, and forming a sort of peninsula.

Arnica (ar'ni-ka), a genus of plants, natural order *Compositæ*, consisting of some 18 species found in Northwestern United States. One is found in Central Europe, *A. montāna* (leopard's bane or mountain tobacco). It has a perennial root, a stem about 2 feet high, bearing on the summit flowers of a dark golden yellow. In every part of the plant there is an acrid resin and a volatile oil, and in the flowers an acrid bitter principle called *arnicin*. The root contains also a considerable quantity of tannin. A tincture of it is employed as an external application to wounds and bruises.

Arnim (ar'nim), ELIZABETH VON, a German writer, also known as Bettina, wife of Louis Achim von Arnim, and sister of the poet Clemens Brentano; born at Frankfort in 1785; died at Berlin 1859. Even in her childhood she manifested an inclination towards eccentricities and poetical peculiarities of many kinds. She entered on a correspondence with Goethe, and contracted an affected and fantastic love towards him—then in his sixtieth year. In 1835 she published Goethe's *Briefwechsel mit einem Kinde* ('Correspondence with a Child'), containing, among others, the letters that she alleged to have passed between her and Goethe. Her later writings were of a politico-social character.—Her husband, LUDWIG ACHIM VON ARNIM, born at Berlin in 1781; died 1831; distinguished himself as a writer of novels. In concert with her brother, Clemens Brentano, he published a collection of popular German songs and ballads entitled *Des Knaben Wunderhorn*.—Her daughter, GISELA VON ARNIM, is known in literature by her *Dramatische Werke*, 3 vols., 1857–63.

Arnim, HARRY KARL EDUARD, COUNT VON, a Prussian diplomatist, born in 1824; died 1881. In 1870 he was ambassador to Rome; in 1872 he became ambassador to Paris, but was recalled on account of differences with Bismarck. Subsequently convicted of lese-majesty.

Arno (är'nō; anc. *Arnus*), a river of Italy which rises in the Etruscan Apennines, makes a sweep to the south and then trends westwards, divides Florence into two parts, washes Pisa, and falls, 4 miles below it, into the Tuscan Sea, after a course of 130 miles.

Arnobius (ar-nō'bi-us), an early Christian writer, was a teacher of rhetoric at Sicca Venerea, in Numidia, and in 303 became a Christian; he died about 326. He wrote seven books

of *Disputationes adversus Gentes*, in which he sought to refute the objections of the heathens against Christianity. This work betrays a defective knowledge of Christianity, but is rich in materials for the understanding of Greek and Roman mythology.

Arnold (ar'nold), BENEDICT, born in Connecticut in 1741, an able general in the Revolutionary war, but who, through dissatisfaction, attempted to betray the strong fortress of West Point, with all the arms and stores there deposited, into the hands of the British. The project failed through the capture of Major André, and Arnold made his escape to the British lines. He received a commission as major-general in the British army, and took part in several marauding expeditions. His name was associated with infamy, even in England, and his after life was miserable. Died in London in 1801.

Arnold, SIR EDWIN, poet, Sanskrit scholar, and journalist, born in England in 1832. Educated at Oxford, where he took the Newdigate prize for a poem entitled the *Feast of Belshazzar* in 1852. He was successively second master in King Edward VI's College at Birmingham, and principal of the Sanskrit College at Poonah, in Bombay. In 1861 he joined the editorial staff of the *Daily Telegraph*. He was the author of *Poems*, narrative and lyrical, numerous translations from the Greek and Sanskrit; *The Light of Asia*, a poem presenting the life and teaching of Gautama, the founder of Buddhism; *The Light of the World*, etc. He died March 24, 1904.

Ar'nold, MATTHEW, English critic, essayist, and poet, was born at Laleham, near Staines, in 1822, being a son of Dr. Arnold, of Rugby. He was educated at Winchester, Rugby, and Oxford, and became a Fellow of Oriel College. He was private secretary to Lord Lansdowne, 1847–51; appointed inspector of schools, 1851; professor of poetry at Oxford, 1858; author of several volumes of poetry, *Essays in Criticism; On the Study of Celtic Literature; Literature and Dogma;* volumes of essays and other works. He enjoyed high reputation for critical ability and literary skill. He died April 15, 1888.

Ar'nold, THOMAS, head-master of Rugby School, and professor of modern history in the University of Oxford, born at Cowes, in the Isle of Wight, in 1795; died in 1842. He entered Oxford in his sixteenth year, and in 1815 he was elected Fellow of Oriel College. After taking deacon's orders he settled at Laleham, near Staines, where he employed himself in preparing young men for the universities. In 1828 he was appointed head-master of Rugby School, and devoted himself to his new duties with the greatest ardor. While giving due prominence to the classics, he deprived them of their exclusiveness by introducing various other branches into his course, and he was particularly careful that the education which he furnished should be in the highest sense moral and Christian. His success was remarkable. Not only did Rugby School become crowded beyond any former precedent, but the superiority of Dr. Arnold's system became so generally recognized that it may be justly said to have done much for the general improvement of the public schools of England. In 1841 he was appointed professor of modern history at Oxford, and delivered his introductory course of lectures with great success. His chief works are his edition of *Thucydides* and his *Roman History*.

Arnold, a borough of Westmoreland Co., Pennsylvania, on the Allegheny River, 15 miles N. E. of Pittsburgh. Pop. 6120.

Ar'nold of Brescia, an Italian religious and political agitator and victim of the twelfth century. He was one of the disciples of Abelard, and attracted a considerable following by preaching against the pope's temporal power. Excommunicated by Innocent II, he withdrew to Zürich, but soon reappearing in Rome he was taken prisoner and burned (1155).

Ar'non, a river in Palestine, the boundary between the country of the Moabites and that of the Amorites, latterly of the Israelites, a tributary of the Dead Sea.

Ar'not, Ar'nut, a name of the agreeably flavored farinaceous tubers of the earth-nut or pig-nut (*Bunium flexuōsum* and *B. Bulbocastănum*). See *Earth-nut*.

Ar'nott, NEIL, an eminent physician and physicist, was born at Arbroath in 1788; died in 1874. Having graduated as M.A. at Aberdeen, he went to England, and was appointed a surgeon in the East India Company's naval service. In 1811 he commenced practice in London. In 1837 he was appointed extraordinary physician to the queen. In 1827 he published *Elements of Physics*, and in 1838 a treatise on *Warming and Ventilation, etc.* He is widely known as the inventor of a stove, which is regarded as one of the most economical arrangements for burning fuel; a ventilating chimney-valve, and his water-bed for the protection of the sick against bedsores.

Arnot'to. See *Annatto.*

Arnsberg (ärnz'ber*h*), a town in Prussia, prov. Westphalia, capital of the government of same name, on the Ruhr. Pop. 8490.

Arnstadt (ärn'stät), a town in Germany, principality of Schwarzburg-Sondershausen, 11 miles S. by W. of Erfurt, upon the Gera, which divides it into two parts. Has manufactures in leather, etc., and a good trade in grain and timber. Pop. 14,413.

Arnswalde (ärnz'väl-de), a town of Prussia, prov. Brandenburg, 39 miles S. E. of Stettin. Pop. 8633.

Arnulf (är'nulf), great grandson of Charlemagne, elected King of Germany in A.D. 887; invaded Italy, captured Rome, and was crowned emperor by the pope (896); died A.D. 899.

Aroideæ (a-roi'de-ē), an order of monocotyledonous plants; same as *Araceæ.*

Arolsen (är'ol-sen), a German town, capital of the principality of Waldeck. Pop. 3000.

Aroma (a-rō'ma), the distinctive fragrance exhaled from spices, plants, etc.; generally an agreeable odor, a sweet smell.

Aromatics (ar-ō-mat'iks), drugs or other substances which yield a fragrant smell, and often a warm pungent taste, as calamus (*Acorus Calămus*), ginger, cinnamon, cassia, lavender, rosemary, laurel, nutmegs, cardamoms, pepper, pimento, cloves, vanilla, saffron. Some of them are used medicinally as tonics, stimulants, etc.

Aromatic vinegar, a very volatile and powerful perfume made by adding the essential oils of lavender, cloves, etc., and often camphor, to crystallizable acetic acid. It is a powerful excitant in fainting, languor, and headache.

Arona (ä-rō'nä), an ancient Italian town near the S. extremity of Lago Maggiore. Pop. 4700. In the vicinity is the colossal statue of San Carlo Borromeo, 70 feet in height, exclusive of pedestal, 42 feet high.

Aroostook (a-rōs'tuk), a river of the Northeastern United States and New Brunswick, a tributary of the St. John, length 140 miles.

Aroura, Arura (a-rō'ra), an ancient Egyptian measure of surface, equal to 21,904 English square feet, or 9 poles 106.3 feet.

Arpad (är-päd'), the hero of Hungarian ballad and romance, founder of the Kingdom of Hungary, born about 870, died 907. The Arpad dynasty reigned till 1301.

Arpeggio (är-pej'ō), the distinct sound of the notes of an instrumental chord; the striking the notes of a chord in rapid succession, as in the manner of touching the harp instead of playing them simultaneously.

Arpent (är-pän), formerly a French measure for land, equal to five-sixths of an English acre; but it varied in different parts of France.

Arpino (är-pē'nō; anc. *Arpinum*), a town of Southern Italy, province of Caserta, celebrated as the birthplace of Caius Marius and Cicero. It manufactures woolens, linen, paper, etc. Pop. 10,607.

Arqua (är'kwä), a village of Northern Italy, about 13 miles S. W. of Padua, where the poet Petrarch died, 18th July, 1374. A monument has been erected over his grave.

Arquebus (är'kwē-bus), a hand-gun; a species of firearm resembling a musket anciently used. It was used by horse and foot troops; sometimes cocked by a wheel, and carried a ball that weighed nearly two ounces. A larger kind used in fortresses carried a heavier shot.

Arraca'cha. See *Aracacha.*

Arracan'. See *Aracan.*

Ar'rack. See *Arack.*

Ar'ragon. See *Aragon.*

Arrah (är'ra), a town of British India, in Shahabad district, Bengal, rendered famous during the mutiny of 1857 by the heroic resistance of a body of twenty civilians and fifty Sikhs, cooped up within a detached house, to a force of 3000 sepoys, who were ultimately routed and overthrown by the arrival of a small European reinforcement. Pop 42,998.

Arraignment (är-rān'-ment), the act of calling or setting a prisoner at the bar of a court to plead guilty or not guilty to the matter charged in an indictment or information. The pleas are, the general issue, *i. e.*, not guilty, or in abatement or in bar; the prisoner may demur to the indictment or he may confess the fact.

Arran (är'ran), an island of Scotland, in the Firth of Clyde, part of Bute county; area, 165 square miles, of which about one-tenth is under cultivation. The inlet of Lamlash, on the coast, forms a capacious bay, completely sheltered by Holy Island, and is one of

the best natural harbors in the west of Scotland. The geology of Arran has attracted much attention, as furnishing within a comparatively narrow space distinct sections of the great geological formations; while the botany possesses almost equal interest both in the variety and the rarity of many of its plants. The Norse held the island until the thirteenth century. Later it sheltered Robert Bruce. Pop. about 5000.

Arrangement (a-rānj'ment), in music, the adaptation of a composition to voices or instruments for which it was not originally written; also, a piece so adapted.

Arran Islands. See *Aran.*

Arrapachitis (ar'a-pa-kī'tis), a city of ancient Mesopotamia, located by Ptolemy between Armenia and Adiabene, though the Assyrian and Babylonian inscriptions appear to indicate a city between the lower Zab and the Tigris. In the latter region Arrapcha, capital of the Gutian kingdom, was situated, though no modern site has yet been found for this city. Arrapcha is spoken of in the time of Hammurabi (2100 B. C.), when it was apparently captured by the Assyrian King Assurnazirpal, it being one of the Assyrian cities that afterwards rebelled against Shalmanezer. After the fall of Nineveh, in 606, Arrapcha became a part of the Chaldæan kingdom under Nebuchadnezzar. In the reign of Cyrus the territory of Arrapachitis was still known as the land of Gutians. The Gutian kings wrote their inscriptions in a Semitic dialect. In Genesis x, 22, Arpachshad is represented as a son of Shem. The land of Arpaha is mentioned as a separate country with Assyria by the Egyptians in the fifteenth century B. C.

Arraroha. See *Araroba.*

Arras (à-rä), a town of France, capital of the department Pas-de-Calais, well built, with several handsome squares and a citadel; cathedral, public library, botanic garden, museum and numerous flourishing industries. In the middle ages it was famous for the manufacture of tapestry, to which the English applied the name of the town itself. Pop. (1906) 20,738.

Arras. A name given to large tapestries employed as wall hangings. Tapestries of this character appear to have been first made at Arras, at that time a city of Flanders, but now a city of France. Large numbers of them were there produced and given the name of their place of manufacture, this being continued after Arras ceased to be their chief center of production. The Italian name for them is Arazzi. A series of these hangings, the most famous of them all, is that for which Raphael made designs.

Arras Campaign. In the early months of 1917 there took place in the region adjoining the city of Arras one of the most notable campaigns on the western front in the great European war. Here the Germans had stubbornly held their own for more than two years, but now they yielded suddenly to the British and French attacks and made a remarkable reverse movement to what became known as 'Hindenburg's Line,' twenty-five miles to the rear of their former position. The campaign in question began on January 11, when the British took nearly a mile of German trenches near Beaumont Hamil. On February 25, while a fog prevailed, the Germans began their great retirement, yielding about three miles in the Ancre section, including the famous Butte de Warlecourt, which had seen some of the bloodiest fighting of the war. On the following day the German retreat continued, nearly twenty-five square miles of territory being yielded to the British. March 17 was marked by the beginning of a more extended German retirement, the British and French advancing without resistance from two to four miles over a front of thirty-five miles in length. On the next day the Allies occupied the fortified town of Peronne. The German line of withdrawal was extended until it was one hundred miles in length, and the retreat continued until twelve miles had been yielded; Noyon and Nesle being given up to the French. In the end the entire Noyon salient was abandoned and the Hindenburg line was reached, twenty-five miles to the rear of the former position. By March 10 two hundred and fifty towns and villages and 1300 square miles of territory had been won by the Entente Allies.

On April 6 the British began a vigorous drive on a twelve-mile front north and south of Arras, the German positions being abandoned for two to three miles and important fortified points captured, including the 'field fortress' of Vimy Ridge (*q. v.*). These advances continued, several thousand prisoners being taken. On April 2 Haig making a sudden thrust north of Arras, and Nivelle did the same between Soissons and Rheims. The Hindenburg line was now reached, and to hold it the Germans threw 240,000 fresh troops against Nivelle, but without checking his advance. The British had now reached Arras and the French were near Laon, the latter storming the large town of Craonne and gaining control of the whole Craonne plateau. The successes of the Allies continued until the British held

the entire Hindenburg line for twelve miles of its length. In the succeeding period the German resistance stiffened and the opinion prevailed that their movement had been strategic in purpose, their intent being to shorten and straighten their line.

During this retirement the Germans devastated the whole country abandoned by them. The villages were destroyed, the crops as far as possible ruined, the farming utensils broken and made useless, the fruit trees cut down or otherwise injured, and in every way possible the country rendered uninhabitable.

Arrest (ăr-rest′) is the apprehending or restraining of one's person, which, in civil cases, can take place legally only by process in execution of the command of some court or officers of justice; but in criminal cases any man may arrest without warrant or precept, and every person is liable to arrest without distinction, but no man is to be arrested unless charged with such a crime as will at least justify holding him to bail when taken. Although ordinarily applied to any legal seizure of a person, *arrest* is the term more properly used in civil cases, and *apprehension* in criminal cases.

Arrest of Judgment, in law, the staying or stopping of a judgment after verdict, for causes assigned. Courts have power to arrest judgment for intrinsic causes appearing upon the face of the record; as when the declaration varies from the original writ; when the verdict differs materially from the pleadings; or when the case laid in the declaration is not sufficient in point of law to found an action upon.

Arretium. See *Arezzo.*

Arrhenatherum (ăr-en-ath′e-rum), a genus of oatlike grasses of which *A. elatius*, sometimes called French rye-grass, is a valuable fodder plant.

Arrhenius (ar-ren′i-us), SVANTE, a noted Swedish chemist, born at Upsala in 1850; educated at the University of Upsala, and became professor of chemistry in the University of Stockholm in 1895. He made many important original observations, and advanced the widely accepted theory of electrolytic dissociation in liquids. He has written on the *Galvanic Conductibility of Electrolytes*, and in German on electrochemistry.

Arria (ăr′ri-a), the heroic wife of a Roman named Cæcina Pætus. Pætus was condemned to death in 42 A. D., for his share in a conspiracy against the emperor Claudius, and was encouraged to suicide by his wife, who stabbed herself and then handed the dagger to her husband with the words, 'It does not hurt, Pætus!'

Arriaga (ăr′re-ága), Manoel de, first president of the republic of Portugal. Born 1842; died 1917. He was born at Horta in the Azores and practised law in Lisbon. He was the English tutor of the late King Carlos and the Duke of Oporto and retired from this position because of his passion for democracy. He protested against the continuance of the monarchy and was one of the leaders in the movement that finally culminated in the establishment of a republic. He became Procurator General in the Portuguese Provisional Government and in August, 1911, he was elected the first constitutional President of Portugal. He was a professor of Columbia University.

Arrian (ăr′ri-an), or FLAVIUS ARRIANUS, a Greek historian, native of Nicomedia, flourished in the second century, under the emperors Hadrian and the Antonines. He was first a priest of Ceres; but at Rome he became a disciple of Epictetus, was honored with the citizenship of Rome, and was advanced to the senatorial and even consular dignities. His extant works are: *The Expedition of Alexander*, in seven books; a book on the affairs of India; an *Epistle to Hadrian;* a *Treatise on Tactics;* a *Periplus of the Sea of Azof and the Red Sea;* and his *Enchiridion*, an excellent moral treatise, containing the discourses of Epictetus.

Arris, in architecture, the line in which the two straight or curved surfaces of a body, forming an exterior angle, meet each other.

Arroba (a-rō′ba; Spanish), a weight formerly used in Spain, and still used in the greater part of Central and South America. In the States of Spanish origin its weight is generally equal to 25.35 lbs. avoirdupois; in Brazil it equals 32.38 lbs.—Also a measure for wine, spirits, and oil, ranging from 2¾ gallons to about 10 gallons.

Arröe, Danish Island. See *Aeröe.*

Arrondissement (à-rōn-dēs-mäṇ), in France an administrative district, the subdivision of a department, or of the quarters of some of the larger cities.

Arrow (ar′ō), a missile weapon, straight, slender, pointed and barbed, to be shot with a bow. See *Archery, Bow.*

Arrowhead (ar′o-hed; *Sagittaria*), a genus of aquatic plants found in all parts of the world

within the torrid and temperate zones; nat. order *Alismaceæ;* distinguished by possessing barren and fertile flowers, with a three-leaved calyx and three colored petals. The common arrowhead (*S. latifolia*) has a tuberous root, nearly globular, and is known by its arrow-shaped leaves with lanceolate straight lobes.

Arrowheaded Characters. See *Cuneiform Writing.*

Arrow Lake, an expansion of the Columbia River, in British Columbia, Canada; about 95 m. long from N. to S.; often regarded as forming two lakes—Upper and Lower Arrow Lake.

Arrowrock Dam, the highest in the world, formally dedicated at Boise, Idaho, October 4, 1915. The dam is 352 feet high, 1100 feet long, and 240 feet wide at the base, tapering to 16 feet at the top. Work on the dam was begun in 1911 by the Reclamation Service, under the direction of F. E. Weymouth, supervising engineer of the Idaho District; Charles H. Paul, construction engineer, and James Mann, superintendent of construction. The cost was $5,000,000. The dam, which is built of solid concrete, crosses the Boise River some distance above the city of Boise, and forms a lake 18 miles long and 200 feet deep. An area of 243,000 acres is to be irrigated by means of the project.

Arrow-root, a starch largely used for food and for other purposes. Arrow-root proper is obtained from the rhizomes or rootstocks of several species of plants of the genus *Maranta* (nat. order Marantaceæ), and perhaps owes its name to the scales which cover the rhizome, which have some resemblance to the point of an arrow. The species from which arrow-root is most commonly obtained is *M. arundinācĕa,* hence called the *arrow-root plant.* Brazilian arrow root, or tapioca meal, is *hot utilissima,* after the poisonous juice has been got rid of; East Indian arrow-root, from the large rootstocks of *Curcŭma angustifolia,* Chinese arrow-root, from the creeping rhizomes of *Nelumbium speciōsum;* English arrow-root, from the potato; Portland arrow-root, from the corms of *Arum maculātum;* and Oswego arrow-root, from Indian corn.

Arrowsmith (ar'o-smith), Aaron, a distinguished English chartographer, born 1750; died 1823; he raised the execution of maps to a perfection it had never before attained. His nephew, John, born 1790, died 1873, was no less distinguished in the same field; his *Atlas of Universal Geography* may be specially mentioned.

Arroyo (ăr-rō'yo), the name of two towns of Spain, in Estremadura, the one, called Arroyo del Puerco (population 7094), about 10 miles west of Caceres; the other, called Arroyo Molinos de Montanches, about 27 miles southeast of Caceres, memorable from the victory gained by Lord Hill over a French force under General Gérard, in 1811. Pop. 2000.

Arru, or Aru (ar'u), Islands, a group belonging to the Dutch, south of western New Guinea, and extending from north to south about 127 miles. They are composed of coraline limestone, nowhere exceeding 200 feet above the sea, and are well wooded and tolerably fertile. The natives belong to the Papuan race, with an intermixture of foreign blood, and are partly Christians. The chief exports are trepang, tortoise-shell, pearls, mother-of-pearl, and edible birds' nests. Pop. of group about 20,000.

Arsaces (ar'sā-sēz), the founder of a dynasty of Parthian kings (256 B.C.), who, taking their name from him, are called Arsacidæ. There were thirty-one in all. See *Parthia.*

Arsamas (ăr-sä-mäs'), a manufacturing town in the Russian government of Nijni-Novgorod, on the Tesha, 250 miles east of Moscow, with a cathedral and large convent. Pop. 10,891.

Arsenal (ăr'sen-al), a royal or public magazine or place appointed for the making, repairing, keeping, and issuing of military stores. An arsenal of the first class should include factories for guns and gun-carriages, and military materials of all kinds. All the European nations have large and important arsenals and there are a number of them in the United States, but individually these are of minor importance.

Arsenic (ăr'sen-ik; symbol As, atomic weight 75), a metallic element of common occurrence, being found in combination with many other metals in a variety of minerals. It is of a tin-white color, and readily tarnishes on exposure to moist air, first changing to yellow, then to gray, then black. In hardness it equals copper; it is extremely brittle, and very volatile, beginning to sublime before it melts. It burns with a blue flame, and emits a smell of garlic. Its specific gravity is 5.76. It forms alloys with most of the metals. Combined with sulphur it forms orpiment and realgar, which are the yellow and red sulphides of arsenic. Orpiment is the true *arsenicum* of the ancients. With oxygen

arsenic forms two compounds, the more important of which is arsenious oxide or arsenic trioxide (As_4O_6), which is the *white arsenic*, or simply *arsenic* of the shops. It is usually seen in white, glassy, translucent masses, and is obtained by sublimation from several ores containing arsenic in combination with metals, particularly from arsenical pyrites. Of all substances arsenic is that which has most frequently occasioned death by poisoning, both by accident and design. The best remedies against the effects of arsenic on the stomach are hydrated sesquioxide of iron or gelatinous hydrate of magnesia, or a mixture of both, with copious draughts of bland liquids of a mucilaginous consistence, which serve to procure its complete ejection from the stomach. Oils and fats generally, milk, albumen, wheat-flour, oatmeal, sugar and syrup have all proved useful in counteracting its effect. Like many other virulent poisons, it is a safe and useful medicine, especially in skin diseases, when judiciously employed. It is used as a flux for glass, and also for forming pigments. The arsenite of copper (Scheele's green) and a double arsenite and acetate of copper (emerald green) are largely used by painters; they are also used to color paper-hangings for rooms, a practice not unaccompanied with considerable danger, especially if flock-papers are used or if the room is a confined one. Arsenic has been too frequently used to give that bright green often seen in colored confectionery, and to produce a green dye for articles of dress and artificial flowers.

Arshin (ȧr-shēn'), a Russian measure of length equal to 28 inches.

Arsinoë (ȧr-sīn'o-ē), a city of ancient Egypt on Lake Moeris, said to have been founded about B.C. 2300, but renamed after Arsinoë, wife and sister of Ptolemy II of Egypt, and called also *Crocodilopolis*, from the sacred crocodiles kept at it.

Arsis (ar'sės), a term applied in prosody to that syllable in a measure where the emphasis is put; in elocution, the elevation of the voice, in distinction from *thesis*, or its depression. *Arsis* and *thesis*, in music, are the strong position and weak position of the bar, indicated by the down-beat and up-beat in marking time.

Arson (ȧr'son), in common law, the malicious burning of a dwelling-house or outhouse of another man, which by the common law is felony, and which, if homicide result, is murder. Also, the willful setting fire to any church, chapel, warehouse, mill, barn, agricultural produce, ship, coal-mine, and the like. In Scotland it is called *willful fire-raising*. In the United States and Great Britain it is a considerable aggravation if the burning is to defraud insurers.

Art, in its most extended sense, as distinguished from nature on the one hand and from science on the other, has been defined as every regulated operation or dexterity by which organized beings pursue ends which they know beforehand, together with the rules and the result of every such operation or dexterity. In this wide sense it embraces what are usually called the useful arts. In a narrower and purely æsthetic sense it designates what is more specifically termed the fine arts, as architecture, sculpture, painting, music, and poetry. The useful arts have their origin in positive practical needs, and restrict themselves to satisfying them. The fine arts minister to the sentiment of taste through the medium of the beautiful in form, color, rhythm, or harmony. See *Painting*, *Sculpture*, etc.—In the middle ages it was common to give certain branches of study the name of arts. See *Arts*.

Arta (ȧr'tȧ), a gulf, river, town and province (monarchy) of Epirus, Greece, on the Ionian Sea. The territory was transferred to Greece in 1878. The town (ancient *Ambrasia*) has a population of 8500. Not far from here was fought the battle of Actium (q. v.), where Antony and Cleopatra were defeated.

Artaxerxes (ȧr-taks-erks'ēs; Old Pers. *Artakhshatra*, 'the mighty'), the name of several Persian kings:—1. ARTAXERXES, surnamed LONGIMANUS, succeeded his father Xerxes I B.C. 465. He subjected the rebellious Egyptians, terminated the war with Athens, governed his subjects in peace, and died B.C. 425.—2. ARTAXERXES, surnamed MNEMON, succeeded his father Darius II in the year 405 B.C. After having vanquished his brother Cyrus he made war on the Spartans, who had assisted his enemy, and forced them to abandon the Greek cities and islands of Asia to the Persians. On his death, B.C. 359, his son Ochus ascended the throne under the name of—3. ARTAXERXES OCHUS (359 to 339 B.C.). After having subjected the Phœnicians and Egyptians, and displayed great cruelty in both countries, he was poisoned by his general Bagoas.

Artedi (ȧr-tā'dē), PETER, a Swedish naturalist, born 1705, drowned at Amsterdam 1735. He studied at Upsala, turned his attention to medicine and natural history, and was a friend of Linnæus. His *Bibliotheca Ichthyologica* and *Philosophia Ichthyologica*, together with

a life of the author, were published at Leyden in 1738.

Artemis (ár'te-mis), an ancient Greek divinity, identified with the Roman Diana. She was the daughter of Zeus (Jupiter) and Leto or Latona, and was the twin sister of Apollo, born in the island of Delos. She is variously represented as a huntress, with bow and arrows; as a goddess of the nymphs, in a chariot drawn by four stags; and as the moon goddess, with the crescent of the moon above her forehead. She was a maiden divinity, never conquered by love, except when Endymion made her feel its power. She demanded the strictest chastity from her worshipers, and she is represented as having changed Actæon into a stag, and caused him to be torn in pieces by his own dogs, because he had secretly watched her as she was bathing. The Artemisia was a festival celebrated in her honor at Delphi. The famous temple of Artemis at Ephesus was considered one of the wonders of the world, but the goddess worshiped there was very different from the huntress goddess of Greece, being of Eastern origin, and regarded as the symbol of fruitful nature.

Artemisia (ár-te-mis'i-a), a genus of plants of numerous species, nat. order Compositæ, comprising mugwort, southern wood, and wormwood. Certain alpine species are the flavoring ingredient in absinthe. See *Wormwood.*

Artemisia, Queen of Caria, in Asia Minor, about 352–350 B.C., sister and wife of Mausōlus, to whom she erected in her capital, Halicarnassus, a monument, called the Mausolēum, which was reckoned among the seven wonders of the world.

Artemisium (ár-te-mis'i-um), a promontory in Eubœa, an island of the Ægean, near which several naval battles between the Greeks and Persians were fought, B.C. 480.

Ar'temus Ward. See *Browne, Charles Farrar.*

Arteries (ar'ter-ēz), the system of cylindrical vessels or tubes, membranous, elastic, and pulsatile, which convey the blood from the heart to all parts of the body, by ramifications which as they proceed diminish in size and increase in number, and terminate in minute capillaries uniting the ends of the arteries with the beginnings of the veins. There are two principal arteries or arterial trunks; the *aorta* which rises from the left ventricle of the heart and ramifies through the whole body, sending off great branches to the head, neck, and upper limbs, and downwards to the lower limbs, etc.; and the *pulmonary artery,* which conveys venous blood from the right ventricle to the lungs, to be purified in the process of respiration.

Arteriotomy (ár-te-ri-ot'o-mi), the opening or cutting of an artery, as, for instance, for the purpose of blood-letting, to relieve pressure of the brain in apoplexy.

Artesian (ár-tēs'yan) Wells, so called from the French province of Artois, where they appear to have been first used on an extensive scale, are perpendicular borings into the ground through which water rises to the surface of the soil, producing a constant flow or stream, the ultimate sources of supply being higher than the mouth of the boring, and the water thus rising by the well-known law. They are generally sunk in valley plains and districts where the lower pervious strata are bent into basin-shaped curves. The rain falling on the outcrops of these saturates the whole porous bed, so that when the bore reaches it the water by hydraulic pressure rushes up towards the level of the highest portion of the strata. The supply is sometimes so abundant as to be used extensively as a moving power, and in arid regions for fertilizing the ground, to which purpose artesian springs have been applied from a very remote period. Thus many artesian wells have been sunk in the Algerian Sahara which have proved an immense boon to the district. The same has been done in the arid region of the United States. The water of most of these is potable, but a few are a little saline, though not to such an extent as to influence vegetation. The hollows in which London and Paris lie are both perforated in many places by borings of this nature. At London they were first sunk only to the sand, but more recently into the chalk. One of the most celebrated artesian wells is that of Grenelle near Paris, 1798 feet deep, completed in 1841, after eight years' work. One at Rochefort, France, is 2765 feet deep, at Columbus, Ohio, 2775, at Pesth, Hungary, 3182, and at St. Louis, Mo., 3843½. Artesian borings have been made in West Queensland 4000 feet deep. At Schladebach, in Prussia, there is one

Artesian Well (D) in the London Basin.

nearly a mile deep. The method of drilling is the same as that for oil wells. See *Boring*.

Artevelde (är'te-vel'de), JACOB VAN, a Flemish popular leader, a brewer of Ghent (1290-1345), who led his people against Louis of Flanders. He was slain in a street riot.—PHILIP VAN (1340-82), son of former, ruler of Flanders in 1381; slain at Roosebeke, Nov. 27, 1382, by the forces of Charles VI.

Art Galleries. Records of private art galleries may be traced back to the museum of Ptolemy Soter at Alexandria; but the early art gallery proper belongs to the Greeks, who set apart a marble hall in the Propylea for a *pinacotheca* or gallery of pictures. The Greeks, because they loved all beauty, adorned the temples of their muses with paintings and statuary. The Romans, later, under Augustus, copied the custom, not so much because they loved beauty as because they loved display; and planned zealously to make all Rome one beautiful gallery or *pinacotheca*.

Probably the first true collection of art may be ascribed to Cosmo di Medici (1389-1464). His collection, with many of the Medicean treasures, forms the nucleus of the present collections housed in the Uffizi-Pitti palace in Florence.

It is since the French Revolution that galleries have become public institutions, whose collections may not be broken without official consent. Private ownership, before the French Revolution, was often disastrous. A political revolution dispersed the collection of Charles I of England.

Art galleries are most easily classified according to type, rather than by country or by theory of collection. Generally speaking, they exist under five groups of auspices. These are: 1. *International* galleries, supported by appropriations from a nation, containing representations of artists from many countries and schools. The British museum, the Louvre, Paris, the National gallery of art, Washington, are examples. 2. *National* galleries, supported by national appropriation and devoted to the art of that particular nation, or to a school of art. Examples are the National gallery, London, the Rodin museum, Paris, and the National gallery of art, Washington (which, on account of special gifts, belongs to both classifications). 3. Collections owned by municipalities. 4. Collections owned by universities, libraries, women's clubs, art clubs, etc., and the collections belonging to private individuals. 5. Collections (mainly of religious art) owned by churches. It was the Church that secured painting and sculpture to the world during the Middle Ages.

Of the international galleries, those of Europe stand pre-eminent. The British National gallery, London, was founded in 1824. There may be found Van Dyck's Portrait of Charles I and Raphael's Ansidea Madonna. Germany has her National gallery of pictures, in Berlin; the gallery at Dresden, which contains the Sistine Madonna; and the old Pinakothek, at Munich, famous for its old German masters, for Dürer's Four Temperaments (Saints Peter, Paul, John, and Mark), Rubens' Massacre of the Innocents, and Murillo's Two Beggar Boys Eating Fruit. The Louvre, Paris, the first national art institute in Europe, was the first collection to be open to everyone. Previously, collections had been accessible only to special patrons of art. The Hermitage, St. Petersburg (Petrograd), established by the efforts of Peter the Great and developed by Catherine, has passed into the hands of the Bolsheviki.

The Uffizi-Pitti palace, Florence, contains the Medicean collection and forms the largest and most popular gallery in the world, although restoration has damaged many pictures. The Pitti palace contains many Raphaels, and some excellent examples of del Sarto, Giorgione, and Perugino. In the Uffizi palace, more non-Italian schools are represented, but the collection is known for Botticelli, da Vinci, Michelangelo, Sodoma, and the schools of art of Tuscany and Umbria.

Of the national galleries, there are the National gallery of British art, and the Victoria and Albert museum, in London; the galleries of Queensland and West Australia, at Brisbane; and the national collections at Dublin and Edinburgh. Paris has the Luxembourg palace. Brussels and Antwerp have national collections of Flemish art, with Matsys, Memlinc, Van Eyck, and Rubens. The Ryks museum is at Amsterdam. Christiania, Stockholm and Copenhagen have their galleries of national art, as have Budapest, Vienna and Basil. Madrid is notable for a small collection of Velasquez. The Italian state maintains twelve collections, mainly of pictorial art. The best ones may be seen at Bologna, Lucca, Parma, Venice, Modena, Turin and Milan. The Corsina and Borghese galleries are at Rome. The Accademia, Florence, (with Michelangelo's Statue of David, Botticelli's Primavera, and Fra Angelico's Last Judgment) is the most important state gallery of early Italian art. The Italian galleries are poorly arranged and little attention has been given to proper lighting.

Most large European and American cities have their own art galleries. The Metropolitan museum, New York, houses its own collection and temporary and permanent loans from private collections. Van Dyck, Jan Vermeer, Pieter de Hooch, Corot, Daubigny, and Joaquin Sorollo's wonderful color poems of folk life are among its treasures. The museum of fine arts in Boston has many paintings by American masters, John La Farge, Whistler, Winslow Homer, John W. Alexander. Chicago has her art institute; Brooklyn, the academy of arts; Buffalo, the Albright museum; New Orleans, the Delgardo museum of art. Cleveland, Cincinnati, Pittsburgh, St. Louis, San Francisco, and many other cities have excellent collections.

Some of the large American universities own choice collections. Probably the most comprehensive group of consecutive examples of early Italian paintings in the world is in the Jarves collection at Yale. The Pennsylvania academy of fine arts, Philadelphia, is the oldest gallery in the United States, and its date, 1805, precedes the British National museum and the Louvre.

Some libraries contain masterpieces of art as well as treasures of the printed page. The mural paintings of the library of Congress, Washington, attract as many people as the books do. The Boston public library is famous for Sargent's Frieze of the Prophets and Abbey's series of the Quest of the Holy Grail. Smaller libraries often coöperate with local women's clubs in bringing small traveling art collections to their towns; and by the annual or occasional purchase of paintings they slowly build small collections representative of American art. The traveling art exhibit originated with the women's club in Richmond, Indiana. Many art clubs own collections. New York probably is the Mecca of privately owned collections.

Most religious paintings are found in churches, especially in the cathedrals of Europe. The papal collection in the Vatican is famous for the representations of classical art and for The Transfiguration, by Raphael; while the collection in the Lateran is of Christian art. See also *Painting.*

Arthritis (ar-thrī'tis), an inflammation of a joint, as in gout, rheumatism, etc.

Arthur (är'thur), Chester Alan, twenty-first president of the United States, born in 1830, at Fairfield, Vt., of Scotch-Irish parentage. His father, Rev. William Arthur, was pastor of Baptist Churches, both in Vermont and New York. He chose law as a profession, and practised in New York. As a politician he became a leader in the Republican party. During the Civil war he was energetic as quarter-master-general of New York in getting troops raised and equipped. He was afterwards collector of customs for the port of New York. In 1880 he was elected vice-president, succeeding as president on the death of Garfield in 1881, and in this position he gave general satisfaction. He died Nov. 18, 1886.

Ar'thur, King, a legendary British hero of the sixth century, son of Uther Pendragon and the Princess Igerna, wife of Gorlois, Duke of Cornwall. He married Guinevere or Ginevra; established the famous order of the Round Table; and reigned, surrounded by a splendid court, twelve years in peace. After this, as the poets relate, he conquered Denmark, Norway, and France, slew the giants of Spain, and went to Rome. From thence he is said to have hastened home on account of the faithlessness of his wife, and Modred, his nephew, who had stirred up his subjects to rebellion. He subdued the rebels, but died in consequence of his wounds, on the island of Avalon. The story of Arthur is supposed to have some foundation in fact, and has ever been a favorite subject with English romanticists and poets. Some believe that he was one of the great Celtic chiefs who led his countrymen from the west of England to resist the settlement of the Saxons in the country; but others regard him as a leader of the Cymry of Cumbria and Strath-Clyde against the Saxon invaders of the east coast and the Picts and Scots north of the Forth and the Clyde.

Arthur's Seat, a picturesque hill within the Queen's Park in the immediate vicinity of Edinburgh; has an altitude of 822 feet; descends rollingly to the N. and E. over a base each way of about five furlongs; presents an abrupt shoulder to the S., and breaks down precipitously to the W. It is composed of a diversity of eruptive rocks, with some interposed and uptilted sedimentary ones; and derives its name somehow from the legendary King Arthur.

Artiad (är'ti-ad; Gr. *artios*, even-numbered), in chemistry, a name given to an element of even equivalency, as a dyad, tetrad, etc.; opposed to a perissad, an element of uneven equivalency, such as a monad, triad, etc.

Artichoke (är'ti-chōk; *Cynăra scolȳmus*), a well-known plant of the nat. order Compositæ, somewhat resembling a thistle, with large divided

prickly leaves. The erect flower-stem terminates in a large round head of numerous imbricated oval spiny scales which surround the flowers. The fleshy bases of the scales with the large receptacle are the parts that are eaten. Artichokes were introduced into England early in the sixteenth century. The Jerusalem artichoke (a corruption of the Ital. *girasole*, a sunflower), or *Helianthus tuberōsus*, is a species of sunflower, whose roots are used like potatoes.

Article (ar'ti-kl), in grammar, a part of speech used before nouns to limit or define their application. In English *a* or *an* is usually called the indefinite article (the latter form being used before a vowel sound), and *the*, the definite article, but they are also described as adjectives. *An* was originally the same as *one*, and *the* as *that*.

Articles of Confederation AND PERPETUAL UNION OF THE COLONIES (the original thirteen), were first submitted by Dr. Benjamin Franklin, July 21, 1775, to the assembly of State delegates called the Continental Congress. They formed the basis of a plan reported to that congress, July 12, 1776. This, after amendment, was agreed to by congress, but was not ratified by all the States until March 1, 1781. The government thus formed was a feeble one, and was set aside in 1789 by the adoption of the present constitution of the United States.

Articles, THE SIX, in English ecclesiastical history, articles imposed by a statute passed in 1539, in the reign of Henry VIII. They decreed the acknowledgment of transubstantiation, the sufficiency of communion in one kind, the obligation of vows of chastity, celibacy of the clergy, auricular confession, and permission of private masses. The act was repealed in 1549.

Articles, THE THIRTY-NINE, of the Church of England, a statement of the particular points of doctrine, thirty-nine in number, maintained by the English Church; first promulgated by a convocation held in London in 1562–63, and confirmed by royal authority; founded on and superseding an older code issued in the reign of Edward VI. They were ratified anew in 1604 and 1628. All candidates for ordination must subscribe these articles, which are now accepted by the Episcopalian Churches of Scotland, Ireland, and America.

Articulata (år-tik-ū-la'ta), the third great section of the animal kingdom according to the arrangement of Cuvier, including all the invertebrates with the external skeleton forming a series of rings articulated together and enveloping the body, distinct respiratory organs, and an internal ganglionated nervous system along the middle line of the body. They are divided into five classes, viz., Crustacea, Arachinida, Insecta, Myriapoda, and Annelida. The term is no longer in use, the first four classes being now grouped together under the name of *Arthropoda*. The whole are sometimes called Arthrozoa.

Articulation (år-tik-ū-lā'shun), in anatomy a joint; the joining or juncture of the bones. This is of three kinds: (1) *Diarthrōsis*, or a movable connection, such as the ball-and socket joint; (2) *Synarthrōsis*, immovable connection, as by suture, or junction by serrated margins; (3) *Symphysis*, or union by means of another substance, by a cartilage, tendon, or ligament.

Artillery (är-til'e-rī), a general term applied to great guns, cannon, or ordnance of all varieties, and also to the military body by whom these arms are served. The method of manufacture of artillery is treated under Cannon (*q. v.*). Here its history and development will be dealt with. This history may be held to date from the discovery of gunpowder, which seems to have been known to the Chinese at a period several centuries before the Christian era. The date of the use of this explosive for warlike purposes, however, is a matter of much doubt. It is said to have been employed in cannon of some kind by the Chinese and the Arabs and to have been employed in the wars between the Moors and Christians in Spain in the 12th century, artillery being used by the Moors against Saragossa in 1118, and later in the defense of Niebla. In the following century it is said to have been used by Henry III of England and by the Spaniards against Cordova. Much of this, however, is very questionable, and the earliest fully authentic dates which we can give are those of the improvement in the manufacture of gunpowder by Berthold Schwartz, a German monk, about 1320, and of the use of cannon by Edward III of England in his war with the Scotch in 1327. This king is also said to have used cannon at Crécy in 1346, where he had an artillery train and an ordnance establishment of several hundred men, though only twelve of these are spoken of as artillerymen and gunners. The cannon used bore the name of 'crake,' those of Edward being termed 'crakeys of war.' Such a powerful agent, far surpassing in its capability the ballistic type of machine, quickly attracted the attention of the medieval world, and before the end of the 14th century it was in general

use throughout Europe, Russia being the last nation to adopt it. The 500th anniversary of its introduction into that country was celebrated in 1889.

The guns of this early period were of the rudest make, being very crude and inefficient. While useful in sieges, they played an inferior part in battles, their weight and the bad roadways of that day unfitting them for rapid maneuvers. These clumsy pieces, with flaring mouths and contracted chambers, were made first of wood, afterwards of iron bars. These were hooped with iron rings—a method still in use, though under very different conditions. The balls fired from them were of rounded stone, iron balls coming later into use. An example of this primitive type of cannon is still in existence in Edinburgh Castle. This is named 'Mons Meg,' and was used in 1455 at the siege of Shrieve Castle by James II of Scotland. It weighs nearly four tons and threw a stone ball weighing over 300 pounds. Five years later James was killed by the explosion of a similar cannon, the 'Lion.' In the century in question, the 15th, marked progress in cannon-making showed itself. The older 'bombards' were replaced by brass guns, and the cumbersome beds upon which the earlier ordnance was transported gave place to rude artillery carriages on wheels, iron balls now replacing those of stone. Towards the end of the century, Charles VIII of France used a numerous train of cannon in his Italian campaigns, and the same may be said of Louis XII, whose success in Italy was largely due to this arm and to the improved organization of the artillery service. The mobility of the guns was increased by Francis I, who adopted a lighter field gun and drew his pieces with the most capable horses.

In England less progress was made, though Henry VII and Henry VIII did much to improve the artillery service. The heavy pieces, known as 'culverins' and by other names, were drawn by oxen, the smaller field guns, 2, 4, 6½ and 8 pounders, known as 'falconets,' 'falcons,' and 'sacres,' being drawn by horses. Little progress was made in England in the succeeding centuries, the 16th and 17th, though in the first half of the latter the artillery service was greatly improved in name and still more so in Sweden, where Gustavus Adolphus did much towards giving the artillery its true position in the battlefield. Mobility and rapidity of fire were his main points. He was the first to appreciate fully the value of concentration of fire, frequently massing his guns in strong batteries at the center and flanks. He also was alive to the advantage of having both heavy and light artillery, it being his practice in a retreat to withdraw his heavy guns, while protecting them with his light field pieces. It was largely to his artillery that he owed his famous success in the Thirty Years' war, the guns of his opponents being of the old unwieldy types. No man had as yet done so much as he in developing the use of this arm of the service.

The 18th century was one of much progress in the artillery branch of the army. In England the Duke of Marlborough was made master-general of the ordnance in 1702 and in his subsequent career aided his victorious movements by efficient use of his guns. The batteries were increased in size and number, and in 1706 a force of 11,000 men had 46 guns and 60 mortars, the latter being mounted on traveling carriages. In 1716 the Royal Regiment of Artillery began its career, and in later years played an active part on many well-fought fields. But in the Napoleonic wars the British artillery lacked the mobility of that of its great opponent, a skilled artillery officer, who made the efficiency of this branch of the service a leading feature in his remarkably successful career. He withdrew the guns from the battalions, organized them into batteries, and assigned these to infantry divisions, thus adding to their efficiency. Other improvements were a reduction of the calibers for field-batteries to 6-pounder guns and 24-pounder howitzers, and those of the horse-batteries to 4-pounders. Military drivers were employed for the latter, instead of teamsters hired by contract, as in former wars. It was Napoleon's custom always to hold in reserve a large number of guns to be brought into use at the decisive stage of the battle, concentrating on the enemy the fire from separate masses of guns. As his infantry was reduced in numbers he increased his supply of artillery. Thus at Austerlitz the proportion was 2½ guns, while at Wagram it was nearly 4 for each 1000 men of other arms.

When the American Civil War began, the field artillery of the army consisted of eight batteries, but most of the seacoast artillery was quickly converted into light batteries and many new batteries were promptly organized. The armament consisted of 3-inch rifled field guns, 6- and 12-pounder bronze smooth bores, 12-pounder bronze mountain howitzers, and 12-, 24- and 32-pounder bronze field howitzers. The range of the 3-inch guns was 2800 yards, and that of the 12-pounder (known as the Napoleon gun) was about 1500 yards. The Eastern armies had artillery divisions of 4 batteries each, these divisions being organized into corps, but in 1863 this system was abolished and the

batteries of each corps were converted into an artillery brigade. The Western and the Confederate armies did not differ materially from this in their artillery organization. The ranges of gun fire ordinarily employed varied from one-half to one mile, though on occasions guns were employed at much shorter distances. It has been said of this war that 'It developed the use of masses of guns to an extent unknown since the days of Napoleon. It infused into the handling of that arm a degree of audacity foreshadowing the tactics of 1870. And if its offensive use of masses had not been all that could be wished, this was due to causes beyond the control of the arm itself.'

As regards the wars subsequent to the one here considered, it must suffice to say that the use of artillery in battle has steadily grown in importance, while that of small arms has decreased, until in the European war of the 20th century, it grew into stupendous proportions, dwarfing all the minor arms effective in former warfare, putting cavalry almost completely out of service, and forcing the armies to seek refuge underground from the prodigious tornado of shot and shell.

Aside from the historical details of the growing use of artillery, so far given, is that of the development of the gun itself, from the crude weapon employed by Edward III to the huge and powerful siege gun, with its marvelous range, of the present day. These great steps of advance include those of rifling, breech-loading, and the employment of explosive shells, in place of the solid shell of early gunnery. It is said that the principles of rifling and breech-loading had been experimented with in England as early as 1547. But any such experiments must have been ineffective, since rifled siege guns were first brought into practical use by the British during the Crimean war, at the siege of Sebastopol. These were poorly constructed and had little useful effect. A few years later the rifled gun, fitted with the breech-loading device, was used in the 1860 China campaign, and was subsequently made a definite feature of the British artillery. The first appearance of rifled field guns in battle was in the Italian war of 1859, this improvement in gunnery being of French invention. During the American Civil War the effective range of field guns was increased by this improvement to 2500 yards. Muzzle-loading rifled guns played a prominent part in this war. The third improvement in cannon, that of using a hollow shell filled with an explosive, in place of the solid shell of the past centuries, was one that added greatly to the destructiveness of artillery fire, especially since the invention of shrapnel by Major Shrapnel in 1802. In this the shell is packed with balls or bullets, which fly in all directions upon its explosion and scatter destruction far and wide. This has become still more the case with the discovery of explosives far surpassing gunpowder in destructive force. To all this must be added the much greater range of recent guns, some of the siege guns of to-day being credited with a range of twenty miles with shells a ton in weight.

One of the artillery surprises of the Great war was the 42-centimeter howitzer used by the German army. Up till its introduction it was supposed that the heaviest guns in the German siege trains were the 28-centimeter (11-inch) howitzers. These were mounted on specially constructed carriages whose wheel pressure on the roadway was brought within safe limits by wide plates fastened to the wheels.

There was an extraordinary number of heavy guns used in the European war. The artillery was rather an enormous siege train than a manœuvering force, such as all sides employed at the beginning of the war. The corps' artillery was almost submerged in the heavy ordnance, which often played a most decisive part in a battle. It has been estimated that in an army of a million men there were more than a quarter of a million artillerymen. In the first stage of the attack on Verdun in 1916 the Germans used three million shells. A fifth of these were for heavy guns from 6-in. to 16.8-in., and with the lighter shells of the quick-firers the total weight of the projectiles was 47,000 tons.

It was in 1916 that the doctrine of 'curtain' fire was first heard. The object of the so-called *tir de barrage* is to keep a belt of ground smothered in shells, so that the enemy shall pay a heavy toll in passing it. See *Coast Artillery, Field Artillery, Howitzer, Mortar, Cannon, Gun, Machine-Gun, Anti-aircraft Gun.*

Artillery Company, THE HONORABLE, the oldest existing body of volunteers in Great Britain, instituted in 1537; revived in 1610. It comprises six companies of infantry, besides artillery, grenadiers, light infantry, and yagers, and furnishes a guard of honor to the sovereign when visiting London.—THE ANCIENT AND HONORABLE ARTILLERY COMPANY of Boston, Mass., copied from that of London, was formed in 1637; was the first regularly organized military company in America.

Artiodactyla (ar-ti-ō-dak'ti-la; Gr. *artios*, even numbered, *daktylos*, a finger or toe), a section of the Ungulata or hoofed mammals, comprising all those in which the number of the toes

is even (two or four), including the ruminants, such as the ox, sheep, deer, etc., and also a number of non-ruminating animals, as the hippopotamus and the pig.

Artocarpeæ (är-to-kar'pe-ē) a natural order of plants, the bread-fruit order, by some botanists ranked as a sub-order of the *Urticaceæ* or nettles. They are trees or shrubs, with a milky juice, which in some species hardens into caoutchouc, and in the cow-tree (*Brosimum Galactodendron*) is a milk said to be as good as that of the cow. Many of the plants produce an edible fruit, of which the best known is the bread-fruit (*Artocarpus*).

Artois (år-twä), a former province of France, anciently one of the seventeen provinces of the Netherlands, now almost completely included in the department of Pas de Calais.

Arts, the name given to certain branches of study in the middle ages, originally called the 'liberal arts' to distinguish them from the 'servile arts' or mechanical occupations. These arts were usually given as grammar, dialectics, rhetoric, music, arithmetic, geometry, and astronomy. Hence originated the terms 'art classes,' 'degrees in arts,' 'Master of Arts,' etc., still in common use in universities, the faculty of arts being distinguished from those of divinity, law, medicine, or science.

Artvin (årt-vēn'), a Russian town, in the Caucasus, about 35 m. inland from Batoum. Pop. 7850.

Aruba (ä-rö'bä), an island off the north coast of Venezuela, belonging to Holland (a dependency of Curaçoa), about 30 m. long and 7 broad; surface generally rock, quartz being abundant, and containing considerable quantities of gold; a phosphate which is exported for manure is also abundant. The climate is healthy. Pop. 9349.

Aru Islands. See *Arru Islands.*

Arum (ā'rum), a genus of plants, nat. order *Araceæ*. *A. maculātum* (the common wakerobin, or lords-and-ladies) is abundant in woods and hedges in England and Ireland. It has acrid properties, but its corm yields a starch, which is known by the name of Portland sago or arrow-root. Indian turnip, or jack-in-the-pulpit, resembling plants of the genus *Arum*, is common in the United States; fruit, a bunch of bright scarlet berries.

Arundel (år'un-del), a town in Sussex, England, on the river Arun, 4 miles from its mouth, the river being navigable to the town for vessels of 250 tons. The castle of Arundel, the chief residence of the Dukes of Norfolk, stands on a knoll on the northeastern side of the town. Pop. 2842.

Cuckoo-pint or Wake-robin (*Arum maculātum*).—*a*, Spadix. *b b*, Stamens or male flowers *c c*, Ovaries or female flowers. *d*. Spathe or sheath. *e*, Corm.

Arundel, THOMAS, third son of Richard Fitz-Alan, Earl of Arundel, born 1353; died 1414. He was chancellor of England and Archbishop of Canterbury. He concerted with Bolingbroke to deliver the nation from the oppression of Richard II, and was a bitter persecutor of the Lollards, the followers of Wickliffe.

Arundelian Marbles, a series of ancient sculptured marbles discovered by an expedition, which explored the ruins of Greece at the expense of and for Thomas Howard, Earl of Arundel, who lived in the time of James I and Charles I and was a liberal patron of scholarship and art. After the Restoration they were presented by the grandson of the collector to the University of Oxford. Among them is the Parian Chronicle, a chronological account of the principal events in Grecian and particularly in Athenian history during a period from the reign of the legendary Cecrops, first King of Athens, to the archonship of Diognetus (B.C. 264).

Arundo (år-un'dō), a genus of grasses now usually limited to the *A. donax* and the species which most nearly agree with it, commonly called reeds. *A. donax* is a native of the south of Europe, Egypt, and the East. It is one of the largest grasses in cultivation, and attains a height of 9 or 10 feet, or even more. Its canes or stems are used for fishing-rods, etc.

Aruspices (a-rus'pi-sēz), HARUSPICES, a class of priests in ancient Rome, of Etrurian origin, whose business was to inspect the entrails of victims killed in sacrifice, and by them to foretell future events

Aruwimi (är-ū-wē′mē), a large river of equatorial Africa, a tributary of the Congo, which it enters from the north. It was first explored by Stanley, during his famous forest journey.

Arval Brothers (*Fratres Arvāles*), a college or company of twelve members elected for life from the highest ranks in ancient Rome, so called from offering annually public sacrifices for the fertility of the fields (L. *arvum*, a field).

Arve (ärv), a river rising in the Savoyan Alps, passes through the valley of Chamouni, and falls into the Rhone near Geneva, after a course of about 50 miles.

Arvicola (är-vik′o-la), a genus of rodent animals, sub-order *Muridæ* or Mice. *A. amphibius* is the water-vole or water-rat), and *A. agrestis* is the field-vole or short-tailed field-mouse.

Aryan (är′yan, ār′i-an), or INDO-EUROPEAN FAMILY OF LANGUAGES. See *Indo-European Family.*

Arzamas. See *Arsamas.*

As, a Roman weight of 12 ounces, answering to the libra or pound, and equal to 5028 grains, or 325.8 grams. In the most ancient times of Rome the copper or bronze coin which was called *as* actually weighed an *as*, or a pound, but in 264 B.C. it was reduced to 2 oz., in 217 to 1 oz., and in 191 to ½ oz.

As (half real size).—Specimen in British Museum.

Asa (ā′sa), great-grandson of Solomon and third king of Judah; he ascended the throne at an early age, and distinguished himself by his zeal in rooting out idolatry with its attendant immoralities. He died after a prosperous reign of forty-one years, about 877 B. C. See I Kings xv: 9-24; II Chron. xiv-xvi.

Asafetida, ASAFOETIDA (as-a-fet′i-da, as-a-fē′ti-da), a fetid inspissated sap from Central Asia, the solidified juice of the *Narthex asafœtida*, a large umbelliferous plant. It is used in medicine as an antispasmodic, and in cases of flatulency, in hysteric paroxysms, and other nervous affections. Notwithstanding its very disagreeable odor it is used as a seasoning in the East, and sometimes in Europe. An inferior sort is the product of certain species of *Ferula.*

Asama (ä-sä′mä), an active volcano of Japan, about 50 miles northwest of Tokio, 8260 feet high.

Asaph (a′saf), a Levite and psalmist appointed by David as leading chorister in the divine services. His office became hereditary in his family, or he founded a school of poets and musicians, which were called, after him, 'the sons of Asaph.'

Asaph, ST., a small cathedral city and bishop's see in Wales, 15 miles west of Flint; founded about 550 by St. Kentigern or St. Mungo, Bishop of Glasgow, and named after his disciple St. Asaph, from whom both the diocese and town took their name. The cathedral was built about the close of the fifteenth century; it consists of a choir, a nave, two aisles, and a transept. Pop. 6170.

Asarabacca (a-sa-ra-bak′a), a small hardy European plant, nat. order Aristolochiaceæ (*Asărum Europæum*). Its leaves are acrid, bitter, and nauseous, and its root is extremely acrid. Both the leaves and root were formerly used as an emetic. The species *A. Canadense*, the Canada snake-root, is found in the Western States.

As′arum. See *Asarabacca.*

As′ben, AIR, or A′HIR, a kingdom of Africa, in the Sahara, between lat. 16° 15′ and 20° 15′ N., and lon. 6° 15′ and 9° 30′ E. It consists of a succession of mountain groups and valleys, with a generally western slope, and attains in its highest summits a height of over 5000 feet. The valleys, though separated by complete deserts, are very fertile, and often of picturesque appearance. The inhabitants are Tuaregs or Berbers, with an admixture of negro blood. They live partly in villages, partly as nomads. It is nominally ruled over by a sultan, who resides in the capital, Agades.

Asbestos (as-bes′tus), a remarkable and highly useful mineral, a fibrous variety of several members of the hornblende family, composed of separable filaments with a silky luster. The fibers are sometimes delicate, flexible, and elastic; at other times stiff and brittle. It is incombustible, and anciently was wrought into a soft, flexible cloth, which was used as a shroud for dead bodies. In modern times it has been manufactured into incombustible cloth, gloves, felt, paper, etc., is employed in gas-stoves; is much used as a covering to steam boilers and pipes; is mixed with metallic pigments, and used as a paint on wooden structures, roofs, partitions, etc., to render them fireproof, and is employed in various

other ways, the manufacture having recently greatly developed. Some varieties are compact and take a fine polish, others are loose, like flax or silky wool. *Liniform asbestos*, or *mountain-wood*, is a variety presenting an irregular filamentous structure, like wood. *Rock-cork*, *mountain-leather*, *fossil-paper*, and *fossil-flax* are varieties. Asbestos is found in many parts of the world, chiefly in connection with serpentine. Canada has long been an important producing field and has supplied the United States until recently, but much is now being obtained from Vermont and Georgia.

Asbjörnsen (ås'byeurn-sen), PETER KRISTEN, born in 1812, died in 1885, a distinguished Norwegian naturalist and collector of the popular tales and legends, fairy stories, etc., of his native country.

Asbury (az'ber-i) PARK, a town on the coast of New Jersey, 50 miles from New York, a great pleasure resort, handsomely built, with wide streets. Pop. 12,400; summer, 50,000.

Ascalon (as'ka-lon; anciently *Ash'kelon*), a ruined town of Palestine, on the sea-coast, 40 miles W. S. W. of Jerusalem. It was occupied by the Crusaders under Richard I after a great battle with Saladin (1192).

Ascanius (ås-kā'ni-us), the son of Æneas and Creusa, and the companion of his father in his wanderings from Troy to Italy.

Ascaris (ås'ka-ris), a genus of intestinal worms. See *Nemathelminthes*.

Ascension (a-sen'shun; discovered on Ascension Day), an island of volcanic origin belonging to Britain, near the middle of the South Atlantic Ocean, 800 miles northwest of St. Helena; area, about 36 square miles; pop. about 400. It is retained by Britain mainly as a station at which ships may touch for stores. It is celebrated for its turtle, which are the finest in the world. Wild goats are plentiful, and oxen, sheep, pheasants, Guinea fowl, and rabbits have been introduced and thrive well. Georgetown, the seat of government, stands on the west side of the island, which is governed under the admiralty by a naval officer.

Ascension, RIGHT, of a star, in astronomy the arc of the equator intercepted between the first point of Aries and that point of the equator which comes to the meridian at the same instant with the star.

Ascension Day, the day on which the ascension of the Saviour is commemorated, often called *Holy Thursday:* a movable feast, always falling on the Thursday but one before Whitsuntide.

Ascetics (a-set'iks), a name given in ancient times to those Christians who devoted themselves to severe exercises of piety and strove to distinguish themselves from the world by abstinence from sensual enjoyments and by voluntary penances. Ascetics and asceticism have played an important part in the Christian church, but the principle of striving after a higher and more spiritual life by subduing the animal appetites and passions has no necessary connection with Christianity. Thus there were ascetics among the Jews previous to Christ, and asceticism was inculcated by the Stoics, while in its most extreme form it may still be seen among the Brahmans and Buddhists. Monasticism was but one phase of asceticism.

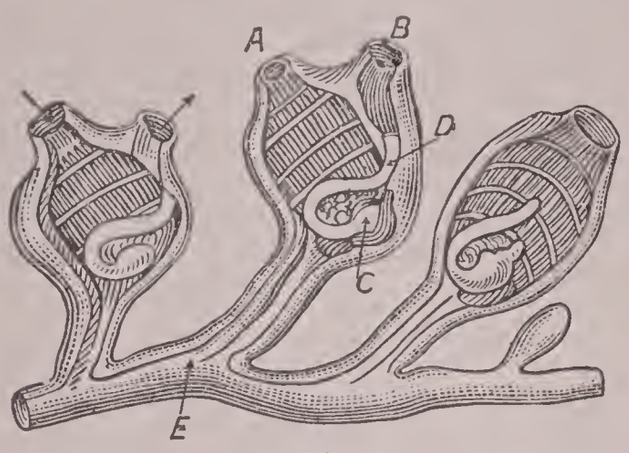
Asch (åsh), a town of Czecho-Slovakia, in the extreme N. W. corner of Bohemia, with manufactures of cotton, woolen and silk goods; also bleaching fields and dye works. Pop. 21,583.

Aschaffenburg (ä-shäf'en-börh), a town of Bavaria, on the Main and Aschaff, 25 miles E. S. E. of Frankfort. The chief edifice is the castle of Johannisberg, built in 1605-14, and for centuries the summer residence of the elector. There are manufactures of colored paper, tobacco, liquors, etc. Pop. 29,892.

Ascham (as'kam), ROGER, a learned Englishman, born in 1515 of a respectable family in Yorkshire, died 1568. He was entered at Cambridge, 1530, and was chosen fellow in 1534 and tutor in 1537. He became Latin secretary to Edward VI and also to Mary. Was preceptor to Elizabeth during her girlhood and her secretary after she ascended the throne. In 1544 he wrote his *Toxophilus, or Schole of Shooting*, in praise of his favorite amusement and exercise—archery. In 1563–68 he wrote his *Schoolmaster*, a treatise on the best method of teaching children Latin. Some of his writings, including many letters, were in Latin. He wrote the best English style of his time. His life was written by Dr. Johnson to accompany an edition of his works published in 1769.

Aschersleben (ăsh'ĕrz-lā-ben), a town of Prussian Saxony, in the district of Magdeburg, near the junction of the Eine with the Wipper. Industries: woolens, machinery and metal goods, beet sugar, paper, etc. Pop. 29,000. It fell to Brandenburg in 1648 and was part of the kingdom of Westphalia, 1807-13.

Ascidia (a-sid'i-a; Greek, *askos*, a wine-skin), the name given to the 'sea-squirts' or main section of the Tunicata, molluscous animals of low grade, resembling a double-necked bottle, of a leathery or gristly nature, found at



Ascidian
A, mouth; *B*, vent; *C*, intestinal canal; *D*, stomach; *E*, common tubular stem.

low-water mark on the sea-beach, and dredged from the deep water attached to stones, shells, and fixed objects. One of the prominent openings admits the food and the water required in respiration; the other is the excretory aperture. A single *ganglion* represents the nervous system, placed between the two apertures. Male and female reproductive organs exist in each ascidian. They pass through peculiar phases of development, the young ascidian appearing like a tadpole-body. They may be *single* or *simple*, *social* or *compound*. In *social ascidians* the peduncles of a number of individuals are united into a common tubular stem, with a partial common circulation of blood. In these animals evolutionists see a link between the Mollusca and the Vertebrata.

Asclepiadaceæ (as-klē-pi-a d-ā'c e-ē), an order of gamopetalous exogenous plants, the distinguishing characteristic of which is that the anthers adhere to the five stigmatic processes, the whole sexual apparatus forming a single mass. The members of this order are shrubs, or sometimes herbaceous plants, occasionally climbing, almost always with a milky juice. Many of them are employed as purgatives, diaphoretics, tonics, and febrifuges, and others as articles of food. *Asclepias* is the typical genus. See articles, *Asclepias* and *Calotropis*.

Asclepiades (as-kle-pī'a-dēs), the name of a number of ancient Greek writers—poets, grammarians, etc.,—of whom little is known, and also of several ancient physicians, the most celebrated of whom was ASCLEPIADES, of Bithynia, who acquired considerable repute at Rome about the beginning of the first century B. C.

Asclepias (as-klē'pi-as), or SWALLOW-WORT, a genus of plants, the type and the largest genus of the nat. order Asclepiadaceæ. Most of the species are North American herbs, having opposite, alternate, or verticillate leaves. Many of them possess powerful medicinal qualities. *A. decumbens* is diaphoretic and sudorific, and has the singular property of exciting general perspiration without increasing in any sensible degree the heat of the body; *A. curassavica* is emetic, and its roots are frequently sold as ipecacuanha. The roots of *A. tuberōsa* are famed for diaphoretic properties.

Ascoli (äs'ko-li), or ASCOLI PICENO (anc. *Asculum*), a town in Middle Italy, capital of the province of the same name, on the Tronto. Pop. 12,583.—The province has an area of 809 sq. miles; a pop. of 243,883.

Ascoli Satriano (anc. *Asculum Apulum*), a town of S. Italy, prov. Foggia. Here Pyrrhus defeated the Romans in 279 B.C. Pop. 8550.

Ascomycetes (a s-k o m-i-sē'tēs), a large group of fungi, so called from their spores being contained in asci or sacs.

Asconius (as-kō'ni-us; QUINTUS A. PEDIANUS), a Roman writer of the first century after Christ, who wrote the life of Sallust, a reply to the detractors of Virgil, and commentaries to Cicero's orations, some of which are extant.

As'cot, an English race-course adjacent to the S. W. extremity of the great park of Windsor.

Asepsis (a-sep'sis), the neutral condition in which there are neither bacteria nor any active antiseptic agents. Water that has boiled for half an hour in a covered vessel is aseptic, but is not antiseptic until an antiseptic has been added. Asepsis is the ideal condition for the treatment of a wound, and the less antiseptic required, the better. See *Antiseptic*.

As'gard (lit. gods' yard, or abode), in Scandinavian mythology the home of the gods or *Æsir*, rising like the Greek Olympus, from *midgard*, or the middle world, that is, the earth. It was here that Odin and the rest of the gods, the twelve Æsir, dwelt—the gods in the mansion called Gladsheim, the goddesses dwelling in Vingulf. Walhalla, in which heroes slain in battle dwelt, was

also here. Below the boughs of the ash-tree Yggdrasill the gods assembled every day in council.

Asgill (as'gil), JOHN, an eccentric English writer, a lawyer by profession; born 1659; died 1738. In 1699 he published a pamphlet to prove that Christians were not necessarily liable to death, death being the penalty imposed for Adam's sin and Christ having satisfied law. Having crossed over to Ireland, he was beginning to get into a good practice, and was elected to the Irish House of Commons, when his pamphlet was ordered to be burned by the public hangman, and he himself was expelled from the house. His whole subsequent life was passed in pecuniary and other troubles, mainly in the Fleet or within the rules of the King's Bench.

Ash (*Fraxinus*), a genus of deciduous trees belonging to the nat. order Oleaceæ, having imperfect flowers and a seed-vessel prolonged into a thin wing at the apex (called a *samara*). There are a good many species, chiefly indigenous to Europe and North America. The common ash (*F. excelsior*), indigenous to Britain, has a smooth bark, and grows tall and rather slender. It is one of the most useful of British trees on account of the excellence of its hard, tough wood and the rapidity of its growth. There are many varieties of it, as the weeping-ash, the curled-leaved ash, the entire-leaved ash, etc. The flowering or manna ash (*F. Ornus*), by some placed in a distinct genus (*Ornus*), is a native of the south of Europe and Palestine. It yields the substance called manna, which is obtained by making incisions in the bark, when the juice exudes and hardens. Among American species are the white ash (*F. Americana*), with lighter bark and leaves; the red or black ash (*F. pubescens*), with a brown bark; the black ash (*F. sambucifolia*), the blue ash, the green ash, etc. They are all valuable trees. The mountain-ash or rowan belongs to a different order.

Ash, ASHES, the incombustible residue of organic bodies (animal or vegetable) remaining after combustion; in common usage, any incombustible residue of bodies used as fuel; as a commercial term, the word generally means the ashes of vegetable substances, from which are extracted the alkaline matters called potash, pearl-ash, kelp, barilla, etc.

Ashango (ash-an'gō), a region in the interior of Western Africa, in French Congo, partly mountainous, partly in the basin of the Ogowai River. The inhabitants belong to the Bantu stock, and among them are a dwarfish people, the Obongo, a branch of the African Pygmies.

Ashanti (ash-an'tē) or Ashantee, British colony, in the interior of the Gold Coast, and to the north of the river Prah, with an area of about 23,000 sq. miles. It is in great part hilly, well watered, and covered with dense tropical vegetation. The country round the towns, however, is carefully cultivated. The crops are chiefly rice, maize, millet, sugar-cane, and yams, the last forming the staple vegetable food of the natives. The domestic animals are cows, horses of small size, goats and a species of hairy sheep. The larger wild animals are the elephant, rhinoceros, giraffe, buffalo, lion, hippopotamus, etc. Birds of all kinds are numerous, and crocodiles and other reptiles abound. Gold is abundant, being found either in the form of dust or in nuggets. The Ashantees, formerly warlike and ferocious, with a love of shedding human blood and of making human sacrifices, are now seemingly of peaceful disposition. They make excellent cotton cloths, articles in gold, and good earthenware, tan leather, and make sword-blades of superior workmanship. The chief town is Coomassie, which, before being burned down in 1874, was well and regularly built with wide streets, and had from 70,000 to 100,000 inhabitants. The British first came in contact with the Ashantees in 1807, and hostilities continued off and on till 1826, when the natives were driven from the sea-coast. Immediately after the transfer of the Dutch settlements on the Gold Coast to Britain in 1872—when the entire coast remained in British hands—the Ashantees reclaimed the sovereignty of the tribes round the settlement of Elmina. This brought on a sanguinary war, leading to a British expedition in 1874, in which Coomassie was captured, and British supremacy established along the gold coast. Ashanti was made a British protectorate in 1896 and annexed to Great Britain, 1901. Pop. 287,814.

Ashborne, a town in Derbyshire, England, on the Dove. It has a church dating from 1241. Pop. 4039.

Ashburner, CHARLES ALBERT, American geologist, born in Philadelphia 1854; died 1889. His work in the Pennsylvania coal fields is of great value to science.

Ashburton, a town in New Zealand, on the left bank of the Ashburton River, 53 miles S. of Christchurch. Pop. 6000.

Ashburton, ALEXANDER BARING, LORD, a British states-

man and financier, born 1774; died 1848. A younger son of Sir Francis Baring, he was bred to commercial pursuits, and in 1810 he became head of the great firm of Baring Brothers & Co. After serving in Parliament for many years and being a member of Peel's government (1834-35), he was raised to the peerage in 1835. See next article.

Ashburton Treaty, a treaty concluded at Washington, 1842, by Alexander Baring, Lord Ashburton, and the President of the United States; it defined the boundaries between the States and Canada, etc.

Asheville (ash'vil), a city, county seat of Buncombe Co., N. C., in the Blue Ridge mountains, the metropolis of western North Carolina. It is a popular all-year resort for tourists. Altitude, 2250 feet. Within a 100-mile circuit are located 64 mountain peaks, 6000 feet and upward, including Mount Mitchell (6711 feet), the highest peak east of the Rockies. Ashville's industries include quilt and cotton mills, furniture, mica and lumber factories, tanneries, foundries and machine shops. Pop. (1910) 18,762; (1920) 28,504.

Ashera (a-shē'ra), an ancient Semitic goddess, whose symbol was the phallus. In the Revised Version of the Old Testament this word is used to translate what in the ordinary version is translated 'grove,' as connected with the idolatrous practices into which the Jews were prone to fall.

Ashes. See *Ash.*

Ashford, a thriving town of England, in Kent, situated near the confluence of the upper branches of the river Stour. It gives name to a parliamentary division of the county. Pop. 13,670.

Ashland, a city of Boyd Co., Kentucky, on the Ohio River, 146 miles east of Cincinnati; is a big iron and lumber center, and has coke, tanning and other industries, and important shipping interests. Seat of Ashland College. Pop. 14,729.

Ashland, a city of Ohio, county seat of Ashland Co., 50 miles W. S. W. of Akron. Its manufactures include agricultural implements, medicines, pumps, rubber goods, automobile supplies, etc. Pop. 9249.

Ashland, a city of Jackson Co., Oregon, 13 miles S. E. of Medford. It is in a rich fruit-growing country, has mineral springs and is a health resort. Pop. (1920) 4283.

Ashland, a borough of Schuylkill Co., in the anthracite region of Pennsylvania, 12 miles N. W. of Pottsville, and engaged in mining and iron manufacture. Pop. 6666.

Ashland, a city, county seat of Ashland Co., Wisconsin, on Lake Superior. It has farming and fruit growing interests, iron and steel works, saw and planing mills, etc., and ships iron ore and lumber. Pop. 11,334.

Ashley, LORD. See *Shaftesbury, First Earl of.*

Ashley, a borough of Luzerne Co., Penna., adjoining Wilkes-Barre, in a coal-mining section. Pop. (1920) 6520.

Ashmole (ash'mōl), ELIAS, an English antiquary, born 1617; died 1692. Author of *Theatrum Chymicum* and *History of Garter Order.* He presented to the University of Oxford his collection of rarities.

Ashokan Reservoir, an artificial lake, 12 miles long, 14 miles west of the Hudson River, at Kingston, N. Y. It is part of New York's great water supply system and was built at a cost of $30,000,000.

Ashtabula (ash-ta-bū'la), a city on four railroads in Ashtabula Co., Ohio, 55 miles northeast of Cleveland; contains various industries, including car repair shops, carriage and automobile works, machine shops, tool works, tanneries, iron ore docks and shipbuilding works, etc. Pop. 22,082.

Ashtaroth (ash'ta-rōth), a goddess worshiped by the ancient Canaanites, and regarded as symbolizing the productive powers of nature, being probably the same as Astarte (q. v.). *Ashtaroth* is a plural form, the singular being *Ashtoreth.*

Ashton-in-Makerfield, a town of Lancashire, England, 4 miles from Wigan, with colleries, cotton mills, etc. Pop. 21,540.

Ashton-under-Lyne, a municipal and parliamentary borough of Lancashire, England, 6 miles E. of Manchester, on the north bank of the river Tame, a well-built place, with handsome streets and public buildings. The chief employment is cotton manufacture, but there are also collieries and iron-works, which employ many persons. Pop. 45,179.

Ash-Wednesday, the first day of Lent, so called from a custom in the Western Church of sprinkling ashes that day on the heads of penitents, then admitted to penance. The period at which the fast of Ash-Wednesday was instituted is uncertain. In the Roman Catholic Church the ashes are now placed on the heads

POLITICAL MAP
OF
ASIA
SCALE OF MILES
0 200 400 800 1200 1600
Hammond's Political Map of Asia
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Longitude East from Greenwich
ATLANTIC OCEAN
ARCTIC OCEAN
PACIFIC OCEAN
INDIAN OCEAN
EUROPE
ASIA
AFRICA
ARABIA
SIBERIA
MONGOLIA
CHINA
TIBET
INDIA
PERSIA
TURKEY
AFGHANISTAN
BALUCHISTAN
NEPAL
BHUTAN
MANCHURIA
JAPAN
KOREA
BOKHARA
SINKIANG
INNER MONGOLIA
Desert of Gobi
Kuen Lun Mts.
Himalaya Mts.
Ural Mts.
Stanovoi Mts.
Khingan Mts.
Great Wall
Grand Canal
Hwang R.
Yangtze R.
Mekong R.
Irtish R.
Indus R.
Ganges R.
Lena R.
Yenisei R.
Amur R.
Volga R.
Euphrates R.
Tigris R.
Nile R.
Red Sea
Persian Gulf
Gulf of Oman
Gulf of Aden
Arabian Sea
Bay of Bengal
Andaman Is.
Nicobar Is.
Laccadive Is.
Maldive Is.
Ceylon
Sea of Okhotsk
Sea of Japan
East China Sea
South China Sea
Yellow Sea
Celebes Sea
Banda Sea
Arafura Sea
Java Sea
Sulu Sea
Strait of Malacca
Strait of Sunda
Torres Str.
Formosa Str.
Bashi Str.
Sanger Str.
Tropic of Cancer
Equator
Arctic Circle
London
Paris
Berlin
Vienna
Warsaw
Rome
Stockholm
Petrograd
Moscow
Constantinople
Cairo
Alexandria
Jerusalem
Damascus
Beirut
Baghdad
Teheran
Mecca
Medina
Aden
Karachi
Bombay
Calcutta
Delhi
Lahore
Kabul
Tashkent
Bokhara
Samarkand
Peking
Tientsin
Nanking
Shanghai
Hankow
Canton
Hongkong
Manila
Singapore
Batavia
Rangoon
Bangkok
Saigon
Hanoi
Tokyo
Yokohama
Osaka
Kyoto
Nagasaki
Seoul
Fusan
Vladivostok
Harbin
Mukden
Irkutsk
Yakutsk
Verkhoyansk
Khabarovsk
Petropavlovsk
Okhotsk
Nikolaifsk
Obdorsk
Tobolsk
Omsk
Tomsk
Krasnoyarsk
Nizhni Udinsk
L. Baikal
Chita
Urga
Kobdo
Uliassutai
Semipalatinsk
Barnaul
Kustani
Akmolinsk
Uralsk
Guriev
Aral L.
L. Balkash
Khiva
Merv
Ashkabad
Kokand
Andidjar
Aksu
Kashgar
Yarkand
Khotan
Suchau
Lanchau
Singan
Hankau
Paoning
Yenchau
Wenchau
Fuchau
Amoy
Swatow
Ningpo
Changsha
Kweiyang
Yunnan
Likiang
Shunning
Langson
Haiphong
Vinh
Tourane
Hue
Pnom Penh
Bassein
Akyab
Mandalay
Manipur
Benares
Cawnpore
Lucknow
Jodhpur
Ahmadabad
Surat
Bareda
Nagpur
Sambalpur
Puri
Sandoway
Daman
Puna
Hyderabad
Kolapur
Panjim
Bellary
Masulipatam
Nellore
Madras
Tavoy
Mergui
Moulmein
Rangoon
Bangalore
Mysore
Calicut
Tuticorin
Kandy
Colombo
Mangalore
Makalla
Hodeida
Sana
Omdu
Maskat
Sohar
Koweit
Bushire
Shiraz
Ispahan
Yezd
Kermah
Lar
Shuster
Resht
Tabriz
Urmia
Bitlis
Mosul
Aleppo
Antioch
Smyrna
Sivas
Amasia
Sinope
Batum
Baku
Erivan
Petropavlovsk
Okhotsk
Nikolaifsk
Sakhalin
Kurile Is.
Yesso
Hakodate
Aomori
Morioka
Sendai
Honshu
Kiushu
Shikoku
Kagoshima
Bonin Is.
Pelew Is.
Philippine Is.
Luzon
Mindanao
Lingayan
Formosa
Hainan
Borneo
Celebes
New Guinea
Papua
Australia
Timor
Flores
Sumbawa
Java
Sumatra
Padang
Boelconiltia
Samarang
Surabaya
Brunei
Sarawak
British North Borneo
Malay Peninsula
Straits Settlements
Georgetown
Penang
Cholon
Zamboanga
Sulu Is.
Celebes Sea
Torres Str.
Arafura Sea
Banda Sea
Java Sea
Gulf of Tonkin
Gulf of Siam
Gulf of Manaar
Gulf of Aden
Gulf of Oman
Persian Gulf
Red Sea
Suez Canal
Panama Canal
Kuria Muria I.
I. Sokotra
Aleutian Is.
Komandorski Is.
Bering Sea
Okhotsk Sea
Japan Sea
Yellow Sea
East China Sea
South China Sea
Celebes Sea
Banda Sea
Arafura Sea
Java Sea
Sulu Sea
Strait of Malacca
Strait of Sunda
Torres Str.
Formosa Str.
Bashi Str.
Sanger Str.
Tropic of Cancer
Equator
Arctic Circle

of all the clergy and people present. In the Anglican Church Ash-Wednesday is regarded as an important fast day.

Asia (ā'sha), the largest of the great divisions of the earth; length, from the extreme southwestern point of Arabia, at the strait of Bab-el-Mandeb, to the extreme northeastern point of Siberia—East Cape, or Cape Vostochni in Bering Strait—6900 miles; breadth, from Cape Chelyuskin, in Northern Siberia, to Cape Romania, the southern extremity of the Malay Peninsula, 5300 miles; area estimated at about 16,000,000 (including the islands 17,000,000), square miles, about a third of all the land of the earth's surface. On three sides, N., E., and S., the ocean forms its natural boundary, while in the W. the frontier is marked mainly by the Ural Mountains, the Ural River, the Caspian Sea, the Caucasus, the Black Sea, the Mediterranean, the Suez Canal, and the Red Sea. There is no proper separation between Asia and Europe, the latter being really a great peninsula of the former. Asia, though not so irregular in shape as Europe, is broken in the S. by three great peninsulas, Arabia, Hindustan, and Indo-China, while the east coast presents peninsular projections and islands, forming a series of sheltered seas and bays, the principal peninsulas being Kamchatka and Corea. The principal islands are those forming the Malay or Asiatic Archipelago, which stretch round in a wide curve on the S. E. of the continent. Besides the larger islands—Sumatra, Java, Borneo, Celebes, Mindanao, and Luzon (in the Philippine group)—there are countless smaller islands grouped round these. Other islands are Ceylon, in the S. of India; the Japanese islands and Sakhalin on the east of the continent; Formosa, S. E. of China; Cyprus S. of Asia Minor; and New Siberia and Wrangell Land, in the Arctic Ocean.

The mountain systems of Asia are of great extent, and their culminating points are the highest in the world. The greatest of all is the Himálayan system, which lies mainly between lon. 70° and 100° E. and lat. 28° and 37° N. It extends, roughly speaking, from northwest to southeast, its total length being about 1500 miles, forming the northern barrier of Hindustan. The loftiest summits are Mount Everest, 29,002 feet high, another peak 28,265, and Kanchinjinga, 28,156. The principal passes, which rise to the height of 18,000 to 20,000 feet, are the highest in the world. A second great mountain system of Central Asia, connected with the northwestern extremity of the Himálayan system by the elevated region of Pamir (about lon. 70°–75° E., lat. 37°–40° N.), is the Thian-Shan system, which runs northeastward for a distance of 1200 miles. In this direction the Altai, Sayan, and other ranges continue the line of elevation to the northeastern coast. A northwestern continuation of the Himálayas is the Hindu Kush, and farther westward a connection may be traced between the Himálayan mass and the Elburz range (18,460 ft.), south of the Caspian, and thence to the mountains of Kurdistan, Armenia, and Asia Minor.

There are vast plateaus and elevated valley regions connected with the great central mountain systems, but large portions of the continent are low and flat. Tibet forms the most elevated tableland in Asia, its mean height being estimated at 15,000 feet. On its south is the Himálayan range, while the Kuen-Lun range forms its northern barrier. Another great but much lower plateau is that which comprises Afghanistan, Beluchistan, and Persia, and which to the northwest joins into the plateau of Asia Minor. The principal plain of Asia is that of Siberia, which extends along the north of the continent and forms an immense alluvial tract sloping to the Arctic Ocean. Vast swamps or peat-mosses called *tundras* cover large portions of this region. Southwest of Siberia, and stretching eastward from the Caspian, is a low-lying tract consisting to a great extent of steppes and deserts, and including in its area the Sea of Aral. In the east of China there is an alluvial plain of some 200,000 square miles in extent; in Hindustan are plains extending for 2000 miles along the south slope of the Himálayas; and between Arabia and Persia, watered by the Tigris and Euphrates, is the plain of Mesopotamia or Assyria, formerly one of the most productive in the world. Of the deserts of Asia, the largest is that of Gobi (lon. 90°–120° E., lat. 40°–48° N.), large portions of which are covered with nothing but sand or display surface of bare rock. An almost continuous desert region may also be traced from the desert of North Africa through Arabia (which is largely occupied by bare deserts), Persia, and Beluchistan to the Indus.

Some of the largest rivers of Asia flow northward to the Arctic Ocean—the Obi, the Yenisei, and the Lena. The Hoang-Ho, the Yang-tse, and the Amoor, are the chief of those which flow into the Pacific. The Ganges, Brahma-

putra, Irawaddy, and Indus, and others of some magnitude empty into the Indian Ocean. The Persian Gulf receives the united waters of the Euphrates and the Tigris. There are several systems of inland drainage, large rivers falling into lakes which have no outlets.

The largest lake of Asia (partly also European) is the Caspian Sea, which receives the Kur from the Caucasus (with its tributary the Aras from Armenia), and the Sefid Rud and other streams from Persia (besides the Volga from European Russia, and the Ural, which is partly European, partly Asiatic). The Caspian lies in the center of a great depression, being 83 feet below the level of the Sea of Azof. East from the Caspian is the Sea of Aral, which, like the Caspian, has no outlet, and is fed by the rivers Amoo Daria (Oxus) and Syr Daria. Still farther east, to the north of the Thian-Shan Mountains, and fed by the Ili and other streams, is Lake Balkash, also without an outlet and very salt. Other lakes having no communication with the ocean are Lob Nor, in the desert of Gobi, receiving the river Tarim, and the Dead Sea, far below the level of the Mediterranean, and fed by the Jordan. The chief fresh-water lake is Lake Baikal, in the south of Siberia, between lon. 104° and 110° E., a mountain lake from which the Yenisei draws a portion of its waters.

Geologically speaking large areas of Asia are of comparatively recent date, the lowlands of Siberia, for instance, having been submerged during the tertiary period, if not more recently. Many geologists believe that subsequently to the glacial period there was a great sea in Western Asia, of which the Caspian and Aral Seas are the remains. The desiccation of Central Asia is still going on, as is also probably the upheaval of a great part of the continent. The great mountain chains and elevated plateaus are of ancient origin, however, and in them granite and other crystalline rocks are largely represented. Active volcanoes are only met with in the extreme east (Kamchatka) and in the Eastern Archipelago. From the remotest times Asia has been celebrated for its mineral wealth. In the Altai and Ural Mountains gold, iron, lead, and platinum are found; in India and other parts rubies, diamonds, and other gems are, or have been, procured; salt in Central Asia; coal in China, India, Central Asia, etc.; petroleum in the districts about the Caspian and in Burmah; bitumen in Syria; while silver, copper, sulphur, etc., are found in various parts.

Every variety of climate may be experienced in Asia, but as a whole it is marked by extremes of heat and cold and by great dryness, this in particular being the case with vast regions in the center of the continent and distant from the sea. The great lowland region of Siberia has a short but hot summer, and a long and intensely cold winter, the rivers and their estuaries being fast bound with ice, and at a certain depth the soil is hard frozen all the year round. The northern part of China to the east of Central Asia has a temperate climate with a warm summer, and in the extreme north a severe winter. The districts lying to the south of the central region, comprising the Indian and Indo-Chinese peninsulas, Southern China, and the adjacent islands, present the characteristic climate and vegetation of the southern temperate and tropical regions modified by the effects of altitude. Some localities in Southeastern Asia have the heaviest rainfall anywhere known. As the equator is approached the extremes of temperature diminish till at the southern extremity of the continent they are such as may be experienced in any tropical country. Among climatic features are the monsoons of the Indian Ocean and the eastern seas, and the cyclones or typhoons, which are often very destructive.

The plants and animals of Northern and Western Asia generally resemble those of similar latitudes in Europe (which is really a prolongation of the Asiatic continent), differing more in species than in genera. The principal mountain trees are the pine, larch, and birch; the willow, alder, and poplar are found in lower grounds. In the central region European species reach as far as the Western and Central Himalayas, but are rare in the Eastern. They are here met by Chinese and Japanese forms. The lower slopes of the Himalayas are clothed almost exclusively with tropical forms. Higher up, between 4000 and 10,000 feet, are found all the types of trees and plants that belong to the temperate zone, there being extensive forests of conifers. Here is the native home of the deodar cedar. The southeastern region, including India, the Eastern Peninsula, and China, with the islands, contains a great variety of plants useful to man and having here their original habitat, such as the sugar-cane, rice, cotton, and indigo; pepper, cinnamon, cassia, clove, nutmeg, and cardamoms; banana, cocoanut, areca and sago palms; the mango and many other fruits, with

plants producing many drugs, also caoutchouc and gutta-percha. The forests of India and the Malay Peninsula contain oak, teak, sâl, and other timber woods, besides bamboos, palms, sandal-wood, etc. The palmyra palm is characteristic of Southern India; while the talipot palm flourishes on the western coast of Hindustan, Ceylon, and the Malay Peninsula. The cultivated plants of India and China include wheat, barley, rice, maize, millet, sorghum, tea, coffee, indigo, cotton, jute, opium, tobacco, etc. In North China and the Japanese Islands large numbers of deciduous trees occur, such as oaks, maples, limes, walnuts, poplars and willows, the genera being European, but the individual species Asiatic. Among cultivated plants are wheat, and in favorable situations rice, cotton, the vine, etc. Coffee, rice, maize, etc., are extensively grown in some of the islands of the Asiatic Archipelago. In Arabia and the warmer valleys of Persia, Afghanistan, and Beluchistan aromatic shrubs are abundant. Over large parts of these regions the date-palm flourishes and affords a valuable article of food. Gum-producing acacias are, with the date-palm, the commonest trees in Arabia. African forms are found extending from the Sahara along the desert region of Asia.

Nearly all the mammals of Europe occur in Northern Asia, with numerous additions to the species. Central Asia is the native land of the horse, the ass, the ox, the sheep, and the goat. Both varieties of the camel, the single and the double humped, are Asiatic. To the inhabitants of Tibet and the higher plateaus of the Himálayas the yak is what the reindeer is to the tribes of the Siberian plain, almost their sole wealth and support. The elephant, of a different species from that of Africa, is a native of tropical Asia. The Asiatic lion, which inhabits Arabia, Persia, Asia Minor, Beluchistan, and some parts of India, is smaller than the African species. Bears are found in all parts, the white bear in the far north, and other species in the more temperate and tropical parts. The tiger is the most characteristic of the larger Asiatic carnivora. It extends from Armenia across the entire continent, being absent, however, from the greater portion of Siberia and from the high tableland of Tibet; it extends also into Sumatra, Java, and Bali. In Southeastern Asia and the islands we find the rhinoceros, buffalo, ox, deer, squirrels, porcupines, etc. In birds nearly every order is represented. Among the most interesting forms are the hornbills, the peacock, the Impey pheasant, the tragopan or horned pheasant, and other gallinaceous birds, the pheasant family being very characteristic of Southeastern Asia. It was from Asia that the common domestic fowl was introduced into Europe. The tropical parts of Asia abound in monkeys, of which the species are numerous. Some are tailed, others, such as the orang, are tailless, but none have prehensile tails like the American monkeys. In the Malay Archipelago marsupial animals, so characteristic of Australia, first occur in the Moluccas and Celebes, while various mammals common in the western part of the archipelago are absent. A similar transition towards the Australian type takes place in the species of birds. Of marine mammals the dugong is peculiar to the Indian Ocean; in the Ganges is found a peculiar species of dolphin. At the head of the reptiles stands the Gangetic crocodile, frequenting the Ganges and other large rivers. Among the serpents are the cobra de capello, one of the most deadly snakes in existence; there are also large boas and pythons besides sea and fresh-water snakes. The seas and rivers produce a great variety of fish. The Salmonidæ are found in the rivers flowing into the Arctic Ocean. Two rather remarkable fishes are the climbing perch and the archer-fish. The well-known goldfish is a native of China.

Asia is mainly peopled by races belonging to two great ethnographic types, the Caucasic or fair type, and the Mongolic or yellow. To the former belong the Aryan or Indo-European, and the Semitic races, both of which mainly inhabit the southwest of the continent; to the latter belong the Malays and Indo-Chinese in the S. E., as well as the Mongolians proper (Chinese, etc.), occupying nearly all the rest of the continent. To these may be added certain races of doubtful affinities, as the Dravidians of Southern India, the Cingalese of Ceylon, the Ainos of Yesso, and some diminutive negro-like tribes called Negritos, which inhabit Malacca and the interior of several of the islands of the Eastern Archipelago. The total population is estimated at about 850,000,000, or more than half that of the whole world. A large portion of Asia is under the dominion of European powers. Russia possesses the whole of Northern Asia (Siberia) and a considerable portion of Central Asia, together with a great part of ancient Armenia, on the south of the Caucasus (pop. 16,000,000); Turkey holds Asia Minor, Syria and Palestine, part of Arabia, Mesopotamia, etc.

(pop. 16,000,000); Great Britain rules over India, Ceylon, a part of the Indo-Chinese Peninsula (Upper and Lower Burmah), and several other possessions (pop. 300,000,000); France has acquired a considerable portion of the Indo-Chinese Peninsula, and has one or two other settlements (pop. 18,000,000); while to Holland belong Java, Sumatra, and other islands or parts of islands, and to the United States the Philippines. The chief independent States are the Chinese Empire (pop. over 340,000,000), Japan (pop. 50,000,000), Siam (pop. 6,000,000), Afghanistan (5,000,000), Beluchistan, Persia (pop. 7,000,000), and the Arabian States (3,000,000). The most important of the religions of Asia are the Brahmanism of India, the creeds of Buddha, Confucius, and Lao-tse in China, and the various forms of Mohammedanism in Arabia, Persia, India, etc. Probably more than a half of the whole population profess some form of Buddhism. Several native Christian sects are found in India, Armenia, Kurdistan, and Syria.

Asia is generally regarded as the cradle of the human race. It possesses the oldest historical documents, and, in common with the immediately contiguous kingdom of Egypt, the oldest historical monuments in the world. The Old Testament contains the oldest historical records which we have of any nation in the form of distinct narrative. The period at which Moses wrote was probably 1500 or 1600 years before the Christian era. His and the later Jewish writings confine themselves almost exclusively to the history of the Hebrews; but in Babylonia, as in Egypt, civilization had made great advances long before this time. In China authentic history extends back probably to about 1000 B.C., with a long preceding period of which the names of dynasties are preserved without chronological arrangement. The kingdoms of Assyria, Babylonia, Media, and Persia, alternately predominated in South-western Asia. In regard to the history of these monarchies much light has been obtained from the decipherment of the cuneiform inscriptions. The arms of the Pharaohs extended into Asia, they being followed by a wide Assyrian dominion. From Cyrus (B.C. 559), who extended the empire of Persia from the Indus to the Mediterranean, while his son, Cambyses, added Egypt and Lybia to it, to the conquest of Alexander (B.C., 330), Persia was the dominant power in Western Asia. Alexander's great empire became broken up into separate kingdoms, which were finally absorbed in the Roman Empire, and this ultimately extended to the Tigris. Soon after the most civilized portions of the three continents had been reduced under one empire the great event took place which forms the dividing line of history, the birth of Christ and the spread of Christianity. In A.D. 226 a protracted struggle began between the newer Persian empire and the Romans, which lasted till the advent of Mohammed and the conquests of the Arabians. Persia was the first great conquest of Mohammed's followers. Syria and Egypt soon fell before their arms, and within forty years of the celebrated flight of Mohammed from Mecca (the *Hejira*), the sixth of the caliphs, or successors of the Prophet, was the most powerful sovereign of Asia. The nomadic tribes of the north next became the dominant race. In 999 Mahmud, whose father, born a Turki slave, became governor of Ghazni, conquered India, and established his rule. The dynasty of the Seljuk Tartars was established in Aleppo, Damascus, Iconium, and Kharism, and was distinguished for its struggles with the Crusaders. Othman, an emir of the Seljuk sultan of Iconium, established the Ottoman Empire in 130[illegible]. About 1220 Genghis Khan, an independent Mongol chief, made himself master of Central Asia, conquered Northern China, overran Turkestan, Afghanistan, and Persia; his successors took Bagdad and extinguished the caliphate. In Asia Minor they overthrew the Seljuk dynasty. One of them, Timur or Tamerlane, carried fire and sword over Northern India and Western Asia, defeated and took prisoner Bajazet, the descendant of Othman (1402), and received tribute from the Greek emperor. The Ottoman Empire soon recovered from the blow inflicted by Timur, but Constantinople was taken and the Eastern Empire finally overthrown by the Sultan Mohammed II in 1453. China recovered its independence about 1368 and was again subjected by the Manchu Tartars (1618–45), soon after which it began to extend its empire over Central Asia. Siberia was conquered by the Cossacks on behalf of Russia (1580–84). The same country effected a settlement in the Caucasus about 1786, and during the later nineteenth century made steady advances into Central and Eastern Asia, but was checked by Japan in the early twentieth. The discovery by the Portuguese of the passage to India by the Cape of Good Hope led to their establishment in the coast of the peninsula (1498). They were speedily followed by the Spanish, Dutch, French, and British. The struggle between the last two powers for

the supremacy of India was completed by the destruction of the French settlements (1760-65). France has recently acquired an extensive territory in Indo-China, while Britain is dominant in India and Burmah. At present the forms of government in Asia range from the primitive rule of the nomad sheik to the experimental democracy of China, which became a republic in 1912. Suan-t'ung was the last of the emperors, bringing to a close the Manchu dynasty, which had reigned in China since 1644. Japan remains an absolute monarchy.

Asia, CENTRAL, a designation loosely given to the regions in the center of Asia east of the Caspian, also called Turkestan, and formerly Tartary. The eastern portion belongs to China, the western now to Russia. Russian Central Asia comprises the Kirghiz Steppe (Uralsk, Turgai, Akmolinsk, Semipalatinsk, etc.), and what is now the government-general of Turkestan, besides the territory of the Turkomans, or Transcaspia and Merv. Russia has thus absorbed the old khanate of Khokand and part of Bokhara and Khiva, and controls the vassal territories of Bokhara and Khiva, the southern boundary being the Persian and Afghan frontiers.

Asia Minor, the most westerly portion of Asia, being the peninsula lying west of the Upper Euphrates, and forming part of Asiatic Turkey. It forms an extensive plateau, with lofty mountains rising above it, the most extensive ranges being the Taurus and Anti-Taurus, which border it on the south and southeast, and rise to over 10,000 feet. There are numerous salt and fresh-water lakes. The chief rivers are the Kizil-Irmak (Halys), Sakaria (Sangarius), entering the Black Sea; and the Sarabat (Hermus) and Menderes (Mæander), entering the Ægean. The coast regions are generally fertile, and have a genial climate; the interior is largely arid and dreary. Valuable forests and fruit-trees abound. Smyrna is the chief town. *Anatolia* is an equivalent name.

Asiphonata (as-i-fon'a-ta), or ASIPHON'IDA, an order of lamellibranchiate, bivalve molluscs, destitute of the siphon or tube through which, in the *Siphonata*, the water that enters the gills is passed outwards. It includes the oysters, the scallop-shells, the pearl-oyster, the mussels, and in general the most useful and valuable molluscs.

Askabad (äs-kä-bäd'), capital of the Russian province of Transcaspia, situated on the Transcaspian railway in the Akhal Tekke oasis. It was occupied by Skobeleff in Jan., 1881, after the sack of Geok Tepé. Its distance from Merv is 232 miles, from Herat 388 miles, and it has become an active commercial center. Pop. about 25,000.

Askew (as'kū), ANNE, a victim of religious persecution; born 1521; martyred 1546. She was a daughter of Sir William Askew, of Lincolnshire, and was married to a wealthy neighbor named Kyme, who, irritated by her Protestantism, drove her from his house. In London, whither she went probably to procure a divorce, she spoke against the dogmas of the old faith, and being tried was condemned to death as a heretic. Being put to the rack to extort a confession concerning those with whom she corresponded, she continued firm, and was then taken to Smithfield, chained to a stake, and burned.

Askja (äsk'yä), a volcano near the center of Iceland, first brought into notice by an eruption in 1875. Its crater is 17 miles in circumference, surrounded by a mountain ring from 500 to 1000 feet high, the height of the mountain itself being between 4000 and 5000 feet.

Asmannshausen (as'manz-hou-zn), a Prussian village on the Rhine, in the district of Wiesbaden, celebrated for its wine. Many judges prefer the red wine of Asmannshausen to the best Burgundy, but it retains its merits for three or four years only.

Asmodeus, or ASHMEDAI (as-mō'dē-us), an evil spirit, who, as related in the book of Tobit, slew seven husbands of Sara, daughter of Raguel, but was driven away into the uttermost parts of Egypt by the young Tobias under the direction of the angel Raphael. Asmodai signifies a desolater, a destroying angel. He is represented in the Talmud as the prince of demons who drove King Solomon from his kingdom.

Asmonæans (as-mo-nē'ans), a family of high-priests and princes who ruled over the Jews for about 130 years, from 153 B.C., when Jonathan, son of Mattathias, the great-grandson of Chasmon or Asmonæus, was nominated to the high-priesthood.

Asnières (än-yār), a town on the Seine, a favorite boating resort with the Parisians. Pop. 35,883.

Asoka (a-sō'ka), an Indian sovereign, who reigned 264–227 B.C. over the whole of Northern Hindustan, grandson of Chandragupta or Sandracottus. He embraced Buddhism, and forced his subjects also to become converts. Many

temples and topes still remaining are attributed to him.

Aso'ka (*Jonesia asôca*), an Indian tree, natural order Leguminosæ, having a lovely flower, showing orange, scarlet, and bright yellow tints; sacred to the god Siva, and often mentioned in Indian literature.

Asopus (a-sō'pus), the name of several rivers in Greece, of which the most celebrated is in Bœotia.

Asp, ASPIC (*Naja*, or *Vipĕra haje*), a species of viper found in Egypt, resembling the cobra de capello or spectacle-serpent of the East Indies, and having a very venomous bite. When approached or disturbed it elevates its head and body, swells out its neck, and appears to stand erect to attack the aggressor. Hence the ancient Egyptians believed that the asps were guardians of the spots they inhabited, and the figure of this reptile was adopted as an emblem of the protecting genius of the world. The balancing motions made by it in the endeavor to maintain the erect attitude have led to the employment of the asp as a dancing serpent by the African jugglers. The 'deaf adder that stoppeth her ear' of Psalm lviii, 4, 5, is translated asp in the margin, and seems to have been this species. Cleopatra is said to have committed suicide by means of an asp's bite, but the incident is generally associated with the Cerastes or horned viper, not with the haje. The name asp is also given to a viper (*Vipera aspis*) common on the continent of Europe.

Asp, from ancient Egyptian monument.

Asparagus (as-par'a-gus; *Asparăgus officinālis*), a plant of the order Liliaceæ, the young shoots of which, cut as they are emerging from the ground, are a favorite culinary vegetable. In Greece, and especially in the southern steppes of Russia and Poland, it is found in profusion; and its edible qualities were esteemed by the ancients. It is mostly boiled and served without admixture, and eaten with butter and salt. It is usually raised from seed; and the plants should remain three years in the ground before they are cut; after which, for ten or twelve years, they will continue to afford a regular annual supply. The beds are protected by straw or litter in winter. Its diuretic properties are ascribed to the presence of a crystalline substance found also in the potato, lettuce, etc.

Aspasia (as-pā'she-a), a celebrated lady of ancient Greece, was born at Miletus, in Ionia, but passed a great part of her life at Athens, where her house was the general resort of the most distinguished men in Greece. She won the affection of Pericles, who united himself to Aspasia as closely as was permitted by the Athenian law, which declared marriage with a foreign woman illegal. Her power in the State has often been exaggerated, but it is beyond question that her genius left its mark upon the administration of Pericles. In 432–1 B.C. she was accused of impiety, and was only saved from condemnation by the eloquence and tears of Pericles. After his death (B.C. 429) Aspasia is said to have attached herself to a wealthy but obscure cattle-dealer of the name of Lysicles, whom she raised to a position of influence in Athens. Nothing more is known of her life. She had a son by Pericles, who was legitimated (B.C. 430) by a special decree of the people.

Aspe (as'pā), a town of southern Spain, prov. of Alicante. There are fine vineyards and noted marble quarries in its vicinity. Pop. 7927.

As'pect, in astrology, denotes the situation of the planets with respect to each other. There are five principal aspects: the sextile, when the planets are 60° distant; quartile, when they are 90° distant; trine, when 120° distant; opposition, when 180° distant; and conjunction, when both are in the same degree. The aspects were classed by astrologers as *benign*, *malignant*, or *indifferent*.

As'pen, or trembling poplar (*Populus tremŭla*), a species of poplar indigenous to most mountainous regions throughout Europe and Asia. It is a beautiful tree of rapid growth and extremely hardy, with nearly circular toothed leaves, smooth on both sides, and attached to footstalks so long and slender as to be shaken by the slightest wind; wood light, porous, soft, and of a white color, useful for various purposes. There are two species of N. American aspen (*P. tremuloides* and *P. grandidenta*), both of which are manufactured into wood pulp for paper making.

Aspergillus (as-per-jil'us), the brush used in Roman Catholic churches for sprinkling holy water on the people. It is said to have been originally made of hyssop.

Aspern and Esslingen (or ESSLING) (es'ling-en), two villages east of Vienna

and on the opposite bank of the Danube; celebrated as the chief contested positions in the bloody but undecisive battle fought between the Archduke Charles and Napoleon I, May 21 and 22, 1809, when it was estimated that the Austrians lost a third of their army, and the French no less than half.

Asperula (as-per'ū-la), the woodruff genus of plants.

Asphalt, Asphaltum (as'falt, as-fal'tum), the most common variety of bitumen; also called mineral pitch. Asphalt is a compact, glossy, brittle, black or brown mineral, which breaks with a polished fracture, melts easily with a strong pitchy odor when heated, and when pure burns without leaving any ashes. It is found in the earth in many parts of Asia, Europe, and America, and in a soft or liquid state on the surface of the Dead Sea, which from this circumstance was called *Asphaltītes*. It is of organic origin, the asphalt of the great Pitch Lake of Trinidad being derived from bituminous shales, containing vegetable remains in the process of transformation. Asphalt is produced artificially in making coal-gas. During the process much tarry matter is evolved and collected in retorts. If this be distilled, naphtha and other volatile matters escape, and asphalt is left behind. It is used for various purposes, very largely for street making in the cities of America and Europe.

Asphalt Rock, a limestone impregnated with bitumen, found in large quanties in various localities in Europe and America. It contains a variable quantity of bitumen (from 7 or 8 to 20 or 30 per cent.) naturally diffused through it. The Val de Travers asphalt, of Switzerland, was discovered in 1710. Since then other asphalt rocks, as well as artificial preparations made by mixing bitumen, gas-tar, pitch, or other materials, with sand, chalk, etc., have been brought into competition with it.

Asphodel (as'fō-del; *Asphodĕlus*), a genus of plants, order Liliaceæ, consisting of perennials, with fasciculated fleshy roots, flowers arranged in racemes, six stamens inserted at the base of the perianth, a sessile almost spherical ovary with two cells, each containing two ovules; fruit a capsule with three cells, in each of which there are, as a rule, two seeds. They are fine garden plants, native of Southern Europe. The king's spear, *A. luteus*, has yellow flowers, blossoming in June. *Asphodĕlus ramōsus*, which attains a height of 5 feet, is cultivated in Algeria and elsewhere, its tubercles yielding a very pure alcohol, and the residue, together with the stalks and leaves, being used in making pasteboard and paper. The asphodel was a favorite plant among the ancients, who were in the habit of planting it round their tombs.

Asphyxia (as-fik'si-a), literally, the state of a living animal in which no pulsation can be perceived, but the term is more particularly applied to a suspension of the vital functions from causes hindering respiration. The normal accompaniments of death from asphyxia are dark fluid blood, a congested brain and exceedingly congested lungs, the general engorgement of the viscera, an absence of blood from the left cavities of the heart while the right cavities and pulmonary artery are gorged. The restoration of asphyxiated persons has been successfully accomplished at long periods after apparent death. The attempt should be made to maintain the heat of the body and to secure the inflation of the lungs as in the case of the apparently drowned.

Aspic (as'pik), a dish consisting of a clear savory meat jelly, containing fowl, game, fish, etc.

Aspidium (as-pid'i-um), a genus of ferns, natural order Polypodiaceæ, comprising the shield-fern and male-fern.

Aspinwall (as'pin-wąl). See *Colon.*

Aspirate (as'pi-rāt), a name given to any sound like our *h*, to the letter *h* itself, or to any mark of aspiration, as the Greek *spiritus asper*, or sounds as the Sanskrit *kh*, *gh*, *bh*, and rough breathing ('or'). Such characters as the Gr. *ch*, *th*, *ph*, are called *aspirates*.

Aspirator (as'pi-rā-tor), an instrument used to promote the flow of a gas from one vessel into another by means of liquid. The simplest form of aspirator is a cylindrical vessel containing water, with a pipe at the upper end which communicates with the vessel containing the gas, and a pipe at the lower end also, with a stopcock and with its extremity bent up. By allowing a portion of the water to run off by the pipe at the lower part of the aspirator a measured quantity of air or other gas is sucked into the upper part.

Asplenium (as-plē'ni-um), a genus of ferns, of the natural order Polypodiaceæ. Several are natives of the United States. The dwarf spleenwort is a very beautiful little fern.

Aspromonte (as-pro-mon'tē), a mountain of Italy in the southwest of Calabria, where Garibaldi was wounded and taken prisoner

with greater part of his army, in August, 1862.

Aspropotamo. See *Achelous.*

Asquith, HERBERT HENRY, British statesman, born at Morley, England, in 1852; educated at Oxford; became a barrister, and was elected to Parliament for East Fife in 1886; Secretary of State for Home Department 1892-95; arbitrated the strike of the London cabmen in 1893. He ably advocated the free trade policy in opposition to Chamberlain in 1903; in 1905 became Chancellor of the Exchequer in the Campbell-Bannerman cabinet, and on the resignation of the premier, April 5, 1908, Mr. Asquith succeeded as premier. The chief events of his government were the advocacy and adoption of old age pensions and the financial scheme of taxation of the estates of the nobility which led to the defeat of the House of Lords and the taking from this branch of the Parliament its power of vetoing bills passed by the Commons. After the beginning of the Great War, in 1914, Mr. Asquith held office as premier till December, 1916, when, following a storm of criticism on the conduct of the war, he resigned office. David Lloyd George succeeded him.

Asrael (az'ra-el), the Mohammedan angel of death, who takes the soul from the body.

Ass (*Equus asĭnus*), a species of the horse genus, supposed by Darwin to have sprung from the wild variety (*Asinus tœniopus*) found in Abyssinia; by some writers to be a descendant of the *onăger* or wild ass, inhabiting the mountainous deserts of Tartary, etc.; and by others to have descended from the kiang or djiggetaí (*A. hemiŏnus*) of southwestern Asia. Both in color and size the ass is exceedingly variable, ranging from dark gray and reddish brown to white, and from the size of a Newfoundland dog in North India to that of a good-sized horse. In the southwestern countries of Asia and in Egypt, in some districts of Southern Europe, as in Spain, and in Kentucky and Peru, great attention has been paid to selection and interbreeding, with a result no less remarkable than in the case of the horse. Thus in Syria there appear to be four distinct breeds: a light and graceful animal used by ladies, an Arab breed reserved for the saddle, an ass of heavier build in use for plowing and draft purposes, and the large Damascus breed. The efforts made to raise the deteriorated British breed have been only partially successful. The male ass is mature at two years of age, the female still earlier. The she-ass carries her young eleven months. The teeth of the young ass follow the same order of appearance and renewal as those of the horse. The life of the ass does not usually exceed thirty years. It is in general much healthier than the horse, and is maintained in this condition by a smaller quantity and coarser quality of food; it is superior to the horse in its ability to carry heavy burdens over the most precipitous roads, and it is in no respect its inferior in intelligence, despite the reputation for stupidity which it has borne from very ancient times. The skin is used as parchment to cover drums, etc., and in the East is made into shagreen. The hybrid offspring of the horse and the female ass is the hinny, that of the ass and the mare is the mule; but the latter is by far the larger and more useful animal. Asses' milk has long been celebrated for its sanative qualities. It contains more sugar of milk and less caseine than that of the cow and is especially valuable for persons with weak digestions. The ass is familiarly known in the United States and Britain as the donkey.

Assab (as-sab'), a bay in Africa, studded with islands, on the southwest coast of the Red Sea.

Assafœtida. See *Asafetida.*

Assai-palm (as'ī; *Euterpe oleracĕa*), a native of tropical S. America, only about 4 inches in diameter and 60 or 80 feet high, with a crown of leaves, beneath which a small fruit grows on branched horizontal spadices. The pulp of the fruit mixed with water is used as a beverage.

Assal (as-sal'), a salt lake in northeastern Africa, in Adal.

Assam (as-sam'), a chief commissionership or province of British India, on the northeast border of Bengal, bounded on the north by the Himalayas, on the east and south mainly by Burmah; area, 49,004 square miles. It forms a series of fertile valleys watered by the Brahmaputra and its tributaries, the valley of the Brahmaputra, which is the main one, consisting of rich alluvial plains, either but little elevated above the river or so low that large extents of them are flooded for three or four days once or twice in the year, while the course of the river often changes. The climate is marked by great humidity, and malarious diseases are common in the low grounds; otherwise it is not unhealthy. The whole province, except the cultivated area, may be designated as forest, the trees including teak, sâl, sissoo, the date and

sago palms, the areca palm (the betel-nut tree), the Indian fig-tree, etc. The article of most commercial importance is tea. Rice is the principal food crop, and other crops are Indian corn, pulse, oil-seeds, sugar-cane, hemp, jute, potatoes, etc. In the jungles and forests roam herds of elephants, the rhinoceros, tiger, buffalo, leopard, bear, wild hog, jackal, fox, goat, and various kinds of deer. Among serpents are the python and the cobra. Pheasants, partridges, snipe, wild peacock, and many kinds of water-fowl abound. Coal, oil and lime are exported to Bengal. There is no single Assamese nationality, and the Assamese language is merely a modern dialect of Bengali. Population 6,126,343, of which about 3,000,000 are Hindus, 1,500,000 Mohammedans, 9000 Buddhists and 17,000 Christians.

Assassination (a-sas'i-nā'shun), a term denoting the killing of any one by surprise or treachery. It is usually applied to the murder of a public personage by one who aims solely at the death of his victim. Among the most important assassinations are:

Philip of Macedon, 336 B. C.
Julius Cæsar, 44 B. C.
Albert, Emperor of Germany, 1308.
James I of Scotland, 1437.
William of Orange, 1584.
Henry III of France, 1589.
Henry IV of France, 1610.
Gustavus III of Sweden, 1792.
Marat, 1793.
Paul, Czar of Russia, 1801.
Lincoln, President of U. S., 1865.
Alexander II, Czar of Russia, 1881.
Garfield, President of U. S., 1881.
Carnot, President of France, 1894.
King Humbert of Italy, 1900.
McKinley, President of U. S., 1901.
Alexander, King of Serbia, and his wife, Queen Draga, 1903.
Sergius, Grand Duke of Russia, 1905.
Carlos, King of Portugal, 1908.
Louis Philippe, Crown Prince of Portugal, 1908.
Prince Ito of Japan, 1909.
Madero, President of Mexico, 1913.
George, King of Greece, 1913.
Archduke Francis Ferdinand of Austria-Hungary and his wife, Duchess of Hohenberg, June 28, 1914.
Jaurès, French socialist leader, July 31, 1914.
Count Tisza, Hungarian statesman, November 1, 1918.
Paes, President of Portugal, 1918.
Liebknecht, German socialist, 1919.
Rathenau, German foreign minister and financier, June 24, 1922.

Assassins (a-sas'inz), an Asiatic order or society having the practice of assassination as its most distinctive feature, founded by Hassan Ben Sabbah, a *dai* or missionary of the heterodox Mohammedan sect, the Ismaelites. The society grew rapidly in numbers, and in 1090 the Persian fortress of Alamut fell into their hands. Other territories were added, and the order became a recognized military power. Its organization comprised seven ranks, at its head being the Sheikh-al-Jebal or 'Old man of the mountains.' Upon a select band fell the work of assassination, to which they were stimulated by the intoxicating influence of *hashish*. From the epithet *Hashishim* (hemp-eaters) which was applied to the order, the European word *assassin* has been derived. For nearly two centuries they maintained their power under nine sheiks. Hassan, after a long and prosperous reign, died in 1124. Most of his successors died violent deaths at the hands of relatives or dependents. After proving themselves strong enough to withstand the powerful sultans Noureddin and Saladin, and making themselves feared by the Crusaders, the *Assassins* were overcome by the Tartar leader, Hulaku. The last chief, Rokneddin, was killed for an act of treachery subsequent to his capture, and his death was followed by a general massacre of the Assassins, in which 12,000 perished. Dispersed bands led a roving life in the Syrian mountains, and it is alleged that in the Druses and other small existing tribes their descendants are still to be found.

Assault (as-sąlt'), in law, an attempt or offer, with force and violence, to do a corporal hurt to another, as by striking at him with or without a weapon. If a person lift up or stretch forth his arm and offer to strike another, or menace any one with any staff or weapon, it is an assault in law. Assault, therefore, does not necessarily imply a hitting or blow, because in trespass for assault and battery a man may be found guilty of the assault and acquitted of the battery. But every battery includes an assault.

Assaye, Assye (as-si'), a village in Southern India, in Hyderabad, where Wellington (then Major-general Wellesley) gained a famous victory in 1803. With only 4500 troops at his disposal he completely routed the Mahratta force of 50,000 men and 100 guns. The victory, however, cost him more than a third of his men.

Assaying (a-sā'ing), the estimation of the amount of pure metal, and especially of the precious metals, in an ore or alloy. In the case of silver the assay is either by the dry or by the wet process. The dry process is

called *cupellation* from the use of a small and very porous cup, called a *cupel*, formed of well-burned and finely-ground bone-ash made into a paste with water. The cupel, being thoroughly dried, is placed in a fire-clay oven about the size of a drain-tile, with a flat sole and arched roof, and with slits at the sides to admit air. This oven, called a *muffle*, is set in a furnace, and when it is at a red heat the assay, consisting of a small weighed portion of the alloy wrapped in sheet-lead, is laid upon the cupel. The heat causes the lead to volatilize or combine with the other metals, and to sink with them into the cupel, leaving a bright globule of pure metallic silver, which gives the amount of silver in the alloy operated on. In the wet process the alloy is dissolved in nitric acid, and to the solution are added measured quantities of a solution of common salt of known strength, which precipitates chloride of silver. The operation is concluded when no further precipitate is obtained on the addition of the salt solution, and the quantity of silver is calculated from the amount of salt solution used. An alloy of gold is first cupelled with lead as above, with the addition of three parts of silver for every one of gold. After the cupellation is finished the alloy of gold and silver is beaten and rolled out into a thin plate, which is curled up by the fingers into a little spiral or *cornet*. This is put into a flask with nitric acid, which dissolves away the silver and leaves the cornet dark and brittle. After washing with water the cornet is boiled with stronger nitric acid to remove the last traces of silver, well washed, and then allowed to drop into a small crucible, in which it is heated, and then it is weighed. The assay of gold, therefore, consists of two parts: *cupellation*, by which inferior metals (except silver) are removed; and *quartation*, by which the added silver and any silver originally present are got rid of. The quantity of silver added has to be regulated to about three times that of the gold. If it be more the cornet breaks up, if it be less the gold protects small quantities of the silver from the action of the acid. Where, as in some gold manufactured articles, these methods of assay cannot be applied, a streak is drawn with the article upon a *touchstone* consisting of coarse-grained Lydian quartz saturated with bituminous matter, or of black basalt. The practised assayer will detect approximately the richness of the gold from the color of the streak, which may be further subjected to an acid test.

Assegai (as'se-gā), a spear used as a weapon among the Kaffirs of S. Africa, made of hard wood tipped with iron, and used for throwing or thrusting.

Assembly (as-sem'bli), GENERAL, the supreme ecclesiastical court of the Established Church of Scotland, consisting of delegates from every presbytery, university, and royal burgh in Scotland. The Free Church of Scotland also has a General Assembly and also the Presbyterian churches in Ireland and America.

Assembly, NATIONAL (France), a body set up in France on the eve of the revolution. Upon the convocation of the States-general by Louis XVI the privileged nobles and clergy refused to deliberate in the same chamber with the commons or *tiers-état* (third estate). The latter, therefore, on the proposition of the Abbé Siéyès, constituted themselves an *assemblée nationale*, with legislative powers (June 17, 1789). They bound themselves by oath not to separate until they had furnished France with a constitution, and the court was compelled to give its assent. In the 3250 decrees passed by the assembly were laid the foundations of a new epoch, and having accomplished this task it dissolved itself, Sept. 30, 1791.

Assen, capital of the province of Drenthe, in the Netherlands, 15 miles S. of Groningen. Pop. 11,191.

As'ser, JOHN, a learned British ecclesiastic, originally a monk of St. David's, distinguished as the instructor, companion, and biographer of Alfred the Great, who appointed him abbot of two or three different monasteries, and finally Bishop of Sherborne, where he died in 908 or 910. His life of Alfred, written in Latin (*Annales Rerum Gestarum Ælfredi Magni*), is of very great value, though its authenticity has been questioned. There is an English translation in Bohn's Antiquarian Library.

Assessment (a-ses'ment), the act of determining the value of a man's property or occupation for the purpose of levying a tax.—The sum assessed or levied; a tax; a rate.—*An assessment of damages* is the fixing of the amount of damages to which the prevailing party in a suit is entitled.

Assessor (a-ses'or), a person appointed to ascertain and fix the amount of taxes, rates, etc., and to make assessments. The 'assessors of taxes,' so named in the United States, are commonly termed 'surveyors' in England.

Assets (as'ets; French, *assez*, enough), property or goods available for the payment of a bankrupt or deceased person's obligations. Assets are personal or real, the former comprising all goods, chattels, etc., devolving upon the executor as salable to discharge debts and legacies. In commerce and bankruptcy the term is often used as the antithesis of 'liabilities,' to designate the stock in trade and entire property of an individual or an association.

Assideans, or CHASIDIM, a party that sprang up among the Jews during the Maccabean struggles. Its purpose was to maintain the Jewish law and resist the growing influence of Hellenism. A similar movement has spread among the Jews of Eastern Europe and the Orient, which has for its object a closer communion with God through the Kabbalah, and the exaltation of the office of rabbi.

Assiento (as-i-en'tō), the permission of the Spanish government to a foreign nation to import negro slaves from Africa into the Spanish colonies in America, for a limited time, on payment of certain duties. It was accorded to the Netherlands about 1552, to the Genoese in 1580, and to the French Guinea Company (afterwards the Assiento Company) in 1702. In 1713 the celebrated *assiento treaty* with Britain for thirty years, was concluded at Utrecht. By this contract the British obtained the right to send yearly a ship of 500 tons, with all sorts of merchandise, to the Spanish colonies. This led to frequent abuses and contraband trade; acts of violence followed, and in 1739 a war broke out between the two powers. At the peace of Aix-la-Chapelle, in 1748, four years more were granted to the British; but in the Treaty of Madrid, two years later, £100,000 sterling were promised for the relinquishment of the two remaining years, and the contract was annulled.

Assignats (ás-ē-nyá), the name of the national paper currency in the time of the French revolution. Assignats to the value of four hundred million francs were first struck off by the Constituent Assembly, with the approbation of the king, April 19, 1790, to be redeemed with the proceeds of the sale of the confiscated goods of the church. August 27th of the same year, Mirabeau urged the issuing of 2,000,000,000 francs of new assignats, which caused a dispute in the assembly. Vergasse and Dupont, who saw that the plan was an invention of Clavière for his own enrichment, particularly distinguished themselves as the opponents of the scheme. Mirabeau's exertions, however, were seconded by Pétion, and 800,000,000 francs more were issued. They were increased by degrees to 45,578,000,000, and their value rapidly declined. In the winter of 1792–93 they lost 30 per cent., and in spite of the law to compel their acceptance at their nominal value they continued to fall till in the spring of 1796 they had sunk to one three hundred and forty-fourth their nominal value. This depreciation was due partly to the want of confidence in the stability of the government, partly to the fact that the coarsely-executed and easily counterfeited assignats were forged in great numbers. They were withdrawn by the Directory from the currency, and at length redeemed by mandats at one-thirtieth of their nominal value.

Assignee (as-i-nē'), a person appointed by another to transact some business, or exercise some particular privilege or power. Formerly the persons appointed under a commission of bankruptcy, to manage the estate of the bankrupt on behalf of the creditors, were so called, but now *trustees* or *receivers*.

Assignment (a-sīn'ment), is a transfer by deed of any property, or right, title, or interest in property, real or personal. Every demand connected with a right of property is assignable.

Assimilation (a-sim-i-lā'shun), the process by which food substances are converted into animal tissue. The nutritive elements are first taken into the blood, and conveyed to all parts of the body, there to aid in rebuilding tissues that have become wasted through organic activity. The tissues draw from the blood suitable material and in some way not known to us add it to their structure. It is this final act that constitutes assimilation. By it bones are united after being broken, and even lost portions of them restored, and whole limbs of some of the lower animals are often rebuilt when lost. In some cases a great part of the body can be thus restored.

Assiniboia (a-sin-i-boi'a), the smallest of the four districts into which a portion of the northwestern territories of Canada was divided in 1882. It is now divided unequally between the two new provinces formed in 1905 out of those four territories, the greater part of it being assigned to Saskatchewan, and a western strip to Alberta. It contains much good wheat land. Some coal is mined. Timber is plentiful and varied.

Assiniboine (a-sin'i-boin), a river of Canada, which flows through Manitoba and joins the Red River at Winnipeg, about 40 miles above the entrance of the latter into Lake Winnipeg, after a somewhat circuitous course of about 500 miles from the west and northwest. Steamers ply on it for over 300 miles.

Assisi (ås-sē'sē), a small town in Italy, in the province of Perugia, 20 miles north of Spoleto, the see of a bishop, and famous as the birthplace of St. Francis d'Assisi. The splendid church built over the chapel where the saint received his first impulse to devotion is one of the finest remains of mediæval Gothic architecture.

Assizes (a-sīz'ez), a term chiefly used in England to signify the sessions of the courts held at Westminster prior to Magna Charta, but thereafter appointed by successive enactments to be held annually in every county. Twelve judges, who are members of the highest courts in England, twice in every year perform a *circuit* into all the counties into which the kingdom is divided (the counties being grouped into seven circuits), to hold these assizes, at which both civil and criminal cases are decided. Occasionally this circuit is performed a third time for the purpose of jail-delivery. In London and Middlesex, instead of circuits, courts of *nisi prius* are held. At the assizes all the justices of the peace of the county are bound to attend. Special commissions of assize are granted for inquest into certain causes.

Among the more important historic uses of the term *assize* are its application to any sitting or deliberative council, and its transference thence to their ordinances, decrees, or assessments. In the latter sense we have the Assizes of Jerusalem, a code of feudal laws formulated in 1099 under Godfrey of Bouillon; the Assizes of Clarendon (1166), of Northampton (1176), and of Woodstock (1184); also the *assisæ venalium* (1203), for regulating the prices of articles of common consumption; the Assize of Arms (1181), an ordinance for organizing the national militia, etc.

Associated Press (a-sō'si-ā t-ed), a combination of daily newspapers, formed in New York in 1850, for the procuring of news by telegraph, or otherwise. For a time it was strongly opposed by a rival organization, but has latterly renewed its strength, and remains the leading distributor of news in the country.

Association (a-sō'shi-ā-shun) OF IDEAS, the term used in psychology to comprise the conditions under which one idea is able to recall another to consciousness. Recently some psychologists have been disposed to classify these conditions under two general heads: the law of contiguity and the law of association. The first states the fact that actions, sensations, emotions, and ideas, which have occurred together, or in close succession, tend to suggest each other when any one of them is afterwards presented to the mind. The second indicates that present actions, sensations. emotions, or ideas tend to recall their like from among previous experiences. Other laws have at times been enunciated, but they are reducible to these; thus, the 'law of contrast or contrariety' is properly a case of contiguity. On their physical side the principles of association correspond with the physiological facts of re-excitation of the same nervous centers, and in this respect they have played an important part in the endeavor to place psychology upon a basis of positive science. The laws of association, taken in connection with the law of relativity, are held by many to be a complete exposition of the phenomena of intellect.

Assonance (as'ō-nans), in poetry, a term used when the terminating words of lines have the same vowel-sound but make no proper rhyme. Such verses, having what we should consider false rhymes, are regularly employed in Spanish poetry; but cases are not wanting in leading British poets. Mrs. Browning not only used them frequently, but justified the use of them.

Assouan (ås-sö-ån'), or ESSOUAN (*Syēnē*), a town of Upper Egypt, on the east bank of the Nile, below the first cataract. The granite quarries of the Pharaohs, from which were procured the stones for the great obelisks and colossal statues of ancient times, are in the neighborhood. Here the British authorities began the building of a colossal dam across the Nile in 1889 and finished it in 1902. It forms a great lake, enabling a large area of land to be irrigated, but burying under its waters in great part the magnificent temple of Isis on the island of Philæ. A height of 23 feet more is being added to the dam, which will completely submerge the temple. The whole dam will supply water to 950,000 acres of land. Trade in dates, senna, etc. Pop. (1907) 16,128.

Assumpsit (a-sum'sit), in common law, an action to recover

compensation for the non-performance of a *parole* promise; that is, a promise not contained in a deed under-seal. Assumpsits are of two kinds, *express* and *implied*. The former are where the contracts are actually made in word or writing; the latter are such as the law implies from the justice of the case; *e. g.*, employment to do work implies a promise to pay.

Assumption (a-sum'shun), the ecclesiastical festival celebrating the miraculous ascent into heaven of the Virgin Mary's body as well as her soul, kept on the 15th of August. The legend first appeared in the third or fourth century, and the festival was instituted some three centuries later.

Assumption, a city in Paraguay. See *Asuncion.*

Assurance. See *Insurance.*

Assyria (a-sir'i-a; the *Asshur* of the Hebrews, *Athurâ* of the ancient Persians), an ancient monarchy in Asia, intersected by the upper course of the Tigris, and having the Armenian mountains on the north and Babylonia on the south; area, probably about 100,000 sq. miles; surface partly mountainous, hilly, or undulating, partly a portion of the fertile Mesopotamian plain. The

Assyrian Soldiers.

numerous remains of ancient habitations show how thickly this region must have once been peopled; now, for the most part, it is a mere wilderness. The chief cities of Assyria in the days of its prosperity were Nineveh, the site of which is marked by mounds opposite Mosul (Nebi Yunus and Koyunjik), Calah or Kalakh (the modern Nimrud), Asshur or Al Asur (Kalah Sherghat), Dur-Sargon (Khorsabad), and Arbela (Arbil).

Much light has been thrown on the history of Assyria by the decipherment of the cuneiform inscriptions obtained by excavation. The assertion of the Bible that the early inhabitants of Assyria went from Babylonia is in conformity with the traditions of later times, and with inscriptions on the disinterred Assyrian monuments. For a long period the country was subject to governors appointed by the kings of Babylonia, but it became independent probably as early as 1500 B. C. About the end of the fourteenth century its king, Shalmaneser, is said to have founded the city of Kalakh or Calah; his son Tiglath-Ninip conquered the whole of the valley of the Euphrates. The five following reigns were chiefly occupied by wars with the Babylonians, who had thrown off the Assyrian yoke. About 1120 Tiglath-Pileser I, one of the greatest of the sovereigns of the first Assyrian monarchy, ascended the throne, and carried his conquests to the Mediterranean on the one side and to the Caspian and the Persian Gulf on the other. At his death there ensued a period of decline, which lasted over 200 years. Under Assur-nazir-pal, who reigned from 884 to 859 B.C., Assyria once more advanced to the position of the leading power in the world, the extent of his kingdom being greater than that of Tiglath-Pileser. The magnificent palaces, temples, and other buildings of his reign prove the advance of the nation in wealth, art, and luxury. In 859 he was succeeded by his son Shalmaneser II, whose career of conquest was equally successful. He reduced Babylon to a state of vassalage, and came into hostile contact with the kings of Palestine, Tyre and Sidon. The old dynasty came to an end in the person of Assurnirari II, who was driven from the throne by a usurper, Tiglath-Pileser, in 745, after a struggle of some years. No sooner was this able ruler firmly seated on the throne than he made an expedition into Babylonia, followed by conquering inroads into Syria and Armenia. He carried the Assyrian arms from Lake Van on the north to the Persian Gulf on the south, and from the confines of India on the east to the Nile on the west. He was, however, driven from his throne by Shalmaneser IV (727), who blockaded Tyre for five years, invaded Israel, and besieged Samaria, but died before the city was reduced. His successor, Sargon (722–705), a usurper, claimed descent from the ancient Assyrian kings, and proved an able ruler and soldier. He subdued Damascus, Elam and Babylon, advanced through Philistia and defeated

the forces of Egypt and Gaza. In 710 Merodach-Baladan was driven out of Babylonia by Sargon, after holding it for twelve years as an independent king, and being supported by the rulers of Egypt and Palestine; his allies were also crushed, Judah was overrun, Ashdod leveled to the ground, and Cyprus taken. He spent the latter years of his reign in internal reforms, in the midst of which he was murdered, being succeeded by Sennacherib, one of his younger sons, in 705. Sennacherib at once had to take up arms against Merodach-Baladan, who had again obtained possession of Babylon. In 701 fresh outbreaks in Syria led him in that direction, and King Hezekiah of Judea was defeated and forced to pay tribute. A second expedition into Syria is briefly recorded in II Kings, xix, where we are told that, as his army lay before Libnah, in one night the angel of Jehovah went out, and smote in the camp of the Assyrians 185,000 men. In 681 he was murdered by his two sons, Adrammelech and Sharezer, but they were defeated by their brother Esar-haddon, who then mounted the throne. Esar-haddon fixed his residence at Babylon, and made it his capital. The most important event of this reign was the conquest of Egypt, which was reduced to a state of vassalage. He associated his son Assur-bani-pal with him in the government of the kingdom (669), and two years later this prince (the Sardanapalus of the Greeks) became sole ruler. In 652 a general insurrection broke out, headed by Sammughes, governor of Babylonia, Assur-bani-pal's own brother, and including Babylonia, Egypt, Palestine, and Arabia. Egypt was the only power, however, which regained its independence; fire, sword, and famine reduced the rest to submission. In 640 the Medes revolted, and later made themselves independent. Though the king's character was marked by cruelty and sensuality, he was a zealous patron of the arts and learning. He died in 625, and was succeeded by his son Assur-emid-ilin (or Sarakos), under whom Babylon definitely threw off the Assyrian yoke. The country continued rapidly to decline, fighting hard for existence until the capital Nineveh was captured and burned by the allied forces of the Medes and Babylonians, about 607 or 606 B.C., and the great Assyrian empire came to an end. The story of Sardanapalus associated with this event is a mere myth or legend. Assyria now fell partly to Media, partly to Babylonia, and afterwards formed with Babylonia one of the satrapies of the Persian empire. In 321 B.C. it became part of the kingdom of the Seleucidæ; later on it came under Parthian rule, and was more than once a Roman possession. For a long period it was under the caliphs of Bagdad. In 1638 the Turks wrested it from the Persians, and it has continued under their dominion since that date.

The original inhabitants of Assyria and Babylonia are known as Accadians (or Sumerians). They seem to have belonged to the Turanian or Ural-Altaic race, to the same stock as that from which the Finns, Turks, and Magyars have descended. In early times a Semitic people spread over the country, and mingled with or supplanted the original inhabitants, while their language took the place of the Accadian, the latter becoming a dead language. The Assyrian language is closely allied to Hebrew and Phœnician, and changed little throughout the 1500 years during which we can trace it in the inscriptions. It continued to be written with the cuneiform or arrowheaded character down to the third century B.C. The greater part of the Assyrian literature was stamped in minute characters on baked bricks, the subjects comprising hymns to the gods, mythological and epic poems, and works on history, chronology, astrology, law, etc. The Accadian literature was largely reproduced, the dead language in which it was written becoming classical and studied as Greek and Latin are in our day. The Assyrian religion was almost the same as that of Babylonia, but in addition to the worship of the Babylonian deities Assyrians adored their national deity, Assur, who was called king of all the gods, the god who created himself. He was symbolically represented by a winged circle inclosing the figure of an archer. After Assur came twelve chief deities; among these twelve ruling gods were Anu, the father of the gods; Bel, the lord of the world; Sin, the moon-god; Shamas, the sun-god; Istar, a powerful goddess with various attributes; Ninip, god of hunting (the man-bull); Nergal, god of war (the man-lion); etc. A number of spirits, good and evil, presided over the minor operations of nature. There were set forms regulating the worship of all the gods and spirits, and prayers to each were inscribed on clay tablets with blanks for the names of the persons using them.

The Assyrians were far advanced in art and industry, and in civilization in general. They constructed large buildings, especially palaces, of a most imposing character, the materials being brick, burned or sun-dried, stone, alabas-

ter slabs for lining and adorning the walls internally and externally, and timber for pulleys and roofs. These alabaster slabs were elaborately sculptured with designs serving to throw much light on the manners and customs of the people. A most

Portal at Khorsabad.

characteristic feature of the palaces were gigantic figures of winged, human-headed bulls, placed at gateways (often arched over) or other important points; figures of lions, etc., were also similarly employed. The palaces were raised on high terraces, and often comprised a great number of apartments; there were no windows, light being obtained by carrying the walls up to a certain height and then raising on them pillars to support the roof and admit light and air. The Assyrian sculptures, as a rule, were in relief, figures in the full round being the exception. In many cases, however, as in those of winged bulls and other monsters, a compromise was attempted between the full round and relief, the heads being worked free and the body in relief, with an additional leg to meet the exigencies of different points of view. More than three-quarters of the reliefs are of warlike scenes; hunting scenes are also favorite subjects; occasionally industrial scenes in connection with palace building are represented, and less frequently religious ceremonials. The artists had no conception of perspective. In some of the hunting scenes an exceedingly high level of art is attained. The vestiges of Assyrian painting consist chiefly of fragments of stucco and glazed tiles, on which are bands of ornament, rows of rosettes and anthemions, woven strap-work, conventionalized mythic animals, and occasionally figures. In these traces of Egyptian influence are to be found, but the Assyrian figure type is, for the most part, of a more voluptuous and vigorous fullness than the Egyptian. Of the advanced condition of the Assyrians in various other respects we have ample evidence. They understood and applied the arch; constructed tunnels, aqueducts, and drains; used the pulley, the lever, and the roller; engraved gems in a highly artistic way; understood the arts of inlaying, enameling, and overlaying with metals; manufactured porcelain, transparent and colored glass, and were acquainted with the lens; and possessed vases, jars, and other dishes, bronze and ivory ornaments, bells, gold ear-rings and bracelets of excellent design and workmanship. Their household furniture also gives a high idea of their skill and taste. The cities of Nineveh, Assur, and Arbela had each their royal observatories, superintended by astronomers-royal, who had to send in their reports to the king twice a month. At an early date the stars were numbered and named; a calendar was formed, in which the year was divided into twelve months (of thirty days each), called after the zodiacal signs, but as this division was found to be inaccurate an intercalary month was added every six years. The week was divided into seven days, the seventh being a day of rest; the day was divided into twelve periods of two hours each, each of these being subdivided into sixty minutes, and these again into sixty seconds. The Assyrians employed both the dial and the clepsydra. Eclipses were recorded from a very remote epoch, and their recurrence roughly determined. The principal astronomical work, called the Illumination of Bel, was inscribed on seventy tablets, and went through numerous editions, one of the latest being in the British Museum. It treats among other things of comets, the polar star, the conjunction of the sun and moon, and the motions of Venus and Mars. Much of this activity in the arts and sciences was a continuation of that of the Accadians of Babylonia, who had advanced far in astronomical and other studies long before the rise of the Assyrian empire.

Assyriology, the department of knowledge which deals with Assyrian antiquities and history, is entirely a modern study. Until 1842 the materials for Assyrian history were derived from the Jewish records of the Old Testament and from such comparatively late writers as Herodotus and Ctesias. In 1843–46 M. Botta, the French consul at Mosul, made the first explorations at Koyunjik and Khorsabad, and the objects thus obtained were transported to the Louvre. In 1845 and in 1849 valuable researches were conducted by Mr. Layard, and subsequently continued by the British Museum trustees. Later researches were instituted by the proprietors of the *Daily Telegraph*, and then by the British government, in which Mr. George Smith

met with considerable success. Subsequently Mr. Rassam carried on the work of discovery. In the decipherment and translation of the cuneiform inscriptions among the most distinguished names are those of Sir Henry Rawlinson, Mr. H. Fox Talbot, Mr. George Smith, M. Jules Oppert, Dr. Schrader, Dr. Hincks, Rev. A. H. Sayce, Mr. Le Page Renouf, Prof. Terrien de la Couperie, Mr. Boscawen, Mr. Pinches, Prof. Hilprecht, and Dr. Peters.

Ast, GEORG ANTON FRIEDRICH, German scholar and philosopher, born 1778; died 1841. He wrote on æsthetics and the history of philosophy, but is best known as an editor of Plato, whose works he published with a Latin translation and commentary.

Astacus (as'ta-kus). See *Crawfish.*

Astarte (as-tar'te), a Syrian goddess, probably corresponding to the *Semĕlē* of the Greeks and the *Ashtaroth* of the Hebrews, and representing the productive power of nature. She was a moon-goddess. Some regard her as corresponding with *Hera* (*Juno*), and others with *Aphroditē.* See *Ashtaroth.*

Astatic (as-tat'ik) NEEDLE, a magnetic needle having another needle of the same intensity fixed parallel to it, the poles being reversed, so that the needles neutralize one another, and are unaffected by the earth's magnetism: used in the *astatic galvanometer.*

Aster (as'ter), a genus of plants, natural order Compositæ, comprehending several hundred species, mostly natives of North America, although others are widely distributed. Many are cultivated as ornamental plants. Asters generally flower late in the season, and some are hence called Michaelmas or Christmas Daisies. The China Aster (*Aster* or *Callistĕphus Chinensis*) is a very showy annual, of which there are many varieties.

Asterbad. See *Astrabad.*

Asteria (as-te'ri-a), a name applied to a variety of corundum, which displays an opalescent star of six rays of light when cut with certain precautions; and also to the *cat's-eye*, which consists of quartz, and is found especially in Ceylon.

Asteridæ. See *Asteroidea.*

Asterisk (as'ter-isk), the figure of a star, thus *, used in printing and writing, as a reference to a passage or note in the margin, or to fill the space when a name, or the like, is omitted.

Asteroidea (as-ter-oi'dē-a), the order of the Echinodermata to which the star-fishes belong. See *Star-fishes.*

Asteroids (as'ter-oids), or PLANETOIDS, a numerous group of very small planets revolving round the sun between the orbits of Mars and Jupiter, remarkable for the eccentricity of their orbits and the large size of their angle of inclination to the ecliptic. The diameter of the largest is not supposed to exceed 450 miles, while most of the others are very much smaller. They number over 700, large numbers having recently been discovered by the aid of photography, though these are fast decreasing. Ceres, the first of them, was discovered 1st January, 1801, and within three years more Pallas, Juno, and Vesta were seen. The extraordinary smallness of these bodies, and their nearness to each other, gave rise to the opinion that they were but the fragments of a planet that had formerly existed and had been brought to an end by some catastrophe. For nearly forty years investigations were carried on, but no more planets were discovered till 8th December, 1845, when a fifth planet in the same region was discovered. The rapid succession of discoveries that followed was for a time taken as a corroboration of the disruptive theory, but the breadth of the zone occupied makes the hypothesis of a shattered planet more than doubtful. Their mean distances from the sun vary between 194,000,000 and 400,000,000 miles; the periods of revolution between 3 years, 3 days and 8 years, 11 months. Their eccentricities and inclinations are on the average greater than those of the earth; their total mass cannot be measured with any approach to accuracy. One of the most interesting of them, discovered in 1898 and named Eros, owes its interest to the fact that its nearest approach to the sun comes within the orbit of Mars, thus bringing it nearer the earth than any planetary body except the moon. Other late discoveries carry the asteroidal orbits beyond Jupiter, so that these bodies occupy an area of immense width.

Asterolepis (as-te-rol'e-pis), a genus of gigantic ganoid fishes, now found only in a fossil state in the Old Red Sandstone. From the remains it would seem that these fishes must have sometimes attained the length of 18 or 20 feet.

Asthma (ast'ma), difficulty of respiration returning at intervals, with a sense of stricture across the chest and in the lungs, a wheezing,

hard cough at first, but more free towards the close of each paroxysm, with a discharge of mucus, followed by a remission. Asthma is essentially a spasm of the muscular tissue which is contained in the smaller bronchial tubes. It generally attacks persons advanced in years, and seems, in some instances, to be hereditary. The exciting causes are various—accumulation of blood or viscid mucus in the lungs, noxious vapors, a cold and foggy atmosphere, or a close, hot air, flatulence, accumulated fæces, violent passions, organic diseases in the thoracic viscera, etc. It frequently accompanies hay fever. By far the most important part of the treatment consists in the obviating or removing the several exciting causes. It seldom proves fatal except as inducing dropsy, consumption, etc. Recently a new method of treatment has been suggested, but it is not yet of general adoption. This consists in giving subcutaneous injections of various proteins; care must be taken that the injection is not made into a blood vessel and all antiseptic precautions must be observed. A large number of these injections may be necessary. Until the cause of asthma is known the old-fashioned remedies (atropine, morphine, epinephrin, nitrites, stramonium, etc.) are the most serviceable.

Asti (äs′tē), a town of Northern Italy, province of Alessandria, 28 miles E. S. E. of Turin. Here Alfieri was born. Pop. (commune) 41,252.

Astigmatism (as-tig′ma-tizm), a defect of vision (capable of correction by suitable glasses), in consequence of which the individual does not see objects in the same plane, although they may really be so. It is due to the degree of convexity of the horizontal and vertical meridians being different, so that corresponding rays, instead of converging into one point, meet at two foci.

Astomata (as-tom′a-ta), one of the two groups into which the Protozoa are divided with regard to the presence or absence of a mouth, of which organ the Astomata are destitute. The group comprises two classes, Gregarinida and Rhizopoda. See *Stomapoda*.

Aston Manor, a large English manufacturing town and parliamentary borough, just N. of Birmingham, with which its industries are connected. Pop. 75,042.

Astor, JOHN JACOB, born near Heidelberg, Germany, 1763; died at New York, 1848. In 1783 he emigrated to the United States, settled at New York, and became extensively engaged in the fur trade. In 1811 the settlement of Astoria, founded by him, near the mouth of the Columbia River, was formed to serve as a central depot for the fur trade between the lakes and the Pacific. He subsequently engaged in various speculations, and died worth $20,000,000, leaving $400,000 to found the Astor Library in New York. This institution is now associated with the New York public library, in common with the Lenox and Tilden Libraries. — WILLIAM WALDORF (Viscount), great-grandson of former, born in New York, 1848; died at Brighton, England, Oct. 18, 1919. He became an English subject in 1899, was created baron in 1916, viscount in 1917. In 1893 he founded the *Pall Mall Magazine*. Author of *Pharaoh's Daughter*, etc.

Astoria (as-tor′i-a), a city of Clatsop county, Oregon, at the mouth of the Columbia River, 70 miles N. W. of Portland. It is one of the largest canning centers and lumber-shipping points in the West. It was founded by John Jacob Astor in 1811. Pop. (1910) 9599; (1920) 14,027.

Astor Place Riot, a riot in New York City on May 10, 1849, between partisans of Edwin Forrest, the American actor, and Macready, who was acting at the Astor Place Opera House. Suppressed by the militia. Twenty-one persons were killed, 36 wounded.

Astrabad (ås-trå-båd′), a town of Persia, capital of a province of the same name on the Caspian. It was formerly the residence of the Kajar princes, the ancestors of the present Persian dynasty. It is very unhealthy, and has been called the *City of the Plague*. Pop. estimated at from 8000 to 30,000.

Astræa (as-trē′a), in Greek mythology, the daughter of Zeus and Themis, and goddess of justice. During the golden age she dwelt on earth, but on that age passing away she withdrew from the society of men and was placed among the stars, where she forms the constellation Virgo. The name was given to one of the asteroids, discovered in 1845.

Astragal (as′tra-gal), in architecture, a small semicircular moulding, with a fillet beneath it, which surrounds a column in the form of a ring, separating the shaft from the capital.

Astragalus, a genus of papilionaceous plants, herbaceous or shrubby, and often spiny. *A. gummifer* yields gum tragacanth.

Astrakhan (ås-trå-*hån*′), ASTRAKAN, a Russian city, capital of government of the same name, on an elevated island in the Volga, about 30 miles above its mouth in the Caspian, communicating with the opposite banks of the river

by numerous bridges. It is the seat of a Greek archbishop and has a large cathedral, as well as places of worship for Mohammedans, Armenians, etc. The manufactures are large and increasing, and the fisheries (sturgeon, etc.) very important. It is the chief port of the Caspian, and has regular steam communication with the principal towns on its shores. Pop. 150,000, composed of various races.—The government has an area of 91,327 square miles. It consists almost entirely of two vast steppes, separated by the Volga. Pop. 1,262,000.

Astrakhan, a name given to sheepskins with a curled woolly surface obtained from a variety of sheep found in Bokhara, Persia, and Syria; also a rough fabric with a pile in imitation of this.

Astral Spirits, spirits formerly believed to people the heavenly bodies or the aerial regions. In the middle ages they were variously conceived as fallen angels, souls of departed men, or spirits originating in fire, and belonging neither to heaven, earth, nor hell. By Theosophists regarded as beings inhabiting the 'astral plane.'

Astringent (as-trin'jènt), a medicine which contracts mucous membranes of the body, thereby checking or diminishing excessive discharges therefrom. The chief astringents are the mineral acids, alum, lime-water, chalk, salts of copper, zinc, iron, lead, silver; and among vegetables catechu, kino, oak-bark, and galls (containing tannic acid).

Astrocaryum (as-trō-kā'ri-um), a genus of tropical American palms, species of which yield oil and valuable fiber. Tucum oil and tucum thread are obtained from *A. vulgāre.*

Astrolabe (as'trō-lāb), an instrument formerly used for taking the altitude of the sun or stars, now superseded by the quadrant and sextant. The name was also formerly given to an armillary sphere.

Astrology (as-trol'o-ji), literally, the science or doctrine of the stars. The name was formerly used as equivalent to astronomy, but is now restricted in meaning to the pseudo-science which pretends to enable men to judge of the effects and influences of the heavenly bodies on human and other mundane affairs, and to foretell future events by their situations and conjunctions. As usually practised the whole heavens, visible and invisible, were divided by great circles into twelve equal parts, called *houses.* As the circles were supposed to remain immovable every heavenly body passed through each of the twelve houses every twenty-four hours. The portion of the zodiac contained in each house was the part to which chief attention was paid, and the position of any planet was settled by its distance from the boundary circle of the house, measured on the ecliptic. The houses had different names and different powers, the first being called the house of life, the second the house of riches, the third of brethren, the sixth of marriage, the eighth of death, and so on. The part of the heavens about to rise was called the *ascendant,* the planet within the house of the ascendant being *lord of the ascendant.* The different *aspects* of the planets were of great importance. To *cast a person's nativity* (or *draw his horoscope*) was to find the position of the heavens at the instant of his birth, which being done, the astrologer, who professed to know the various powers and influences possessed by the sun, the moon, and the planets, would predict what the course and termination of that person's life would be. The temperament of the individual was ascribed to the planet under which he was born, as *saturnine* from *Saturn, jovial* from *Jupiter, mercurial* from *Mercury,* etc., words which are now used with little thought of their original meaning. The virtues of herbs, germs, and medicines were supposed to be due to their ruling planets.

Astronomy (as-tron'o-mi; from Gr. *astron,* a star, and *nemein,* to arrange, classify) is that science which investigates the motions, distances, magnitudes, and various phenomena of the heavenly bodies. That part of the science which gives a description of the motions, figures, periods of revolution, and other phenomena of the heavenly bodies is called *descriptive astronomy;* that part which teaches how to observe the motions, figures, periodical revolutions, distances, etc., of the heavenly bodies, and how to use the necessary instruments, is called *practical astronomy;* and that part which explains the causes of their motions and demonstrates the laws by which those causes operate is termed *physical astronomy.* Recent years have added two new fields of investigation which are full of promise for the advancement of astronomical science. The first of these—celestial *photography*—has furnished us with invaluable light-pictures of the sun, moon, and other bodies, and has recorded the existence of myriads of stars, invisible even by the best telescopes; while the second *spe*

trum analysis, reveals to us a knowledge of the physical constituents of the universe, informing us, for instance, that in the sun (or its atmosphere) there exist many of the elements familiar to us on the earth. It has also been applied to the determination of the velocity with which stars are approaching to, or receding from, our system; and to the measurement of movements taking place within the solar atmospheric envelopes. From analysis of some of the unresolved nebulæ the inference is drawn that they are not star-swarms but simply cosmical vapor; whence a second inference results favorable to the hypothesis of the gradual condensation of nebulæ, and the successive evolutions of suns and systems.

The most remote period to which we can go back in tracing the history of astronomy refers us to a time about 2500 B.C., when the Chinese are said to have recorded the simultaneous conjunction of Saturn, Jupiter, Mars, and Mercury with the moon. This remarkable phenomenon is found, by calculating backward, to have taken place 2460 B.C. Astronomy has also an undoubtedly high antiquity in India. In the time of Alexander the Great, the Babylonians had records of astronomical observations reaching back 1900 years, and had probably been students of astronomy much earlier. They regarded comets as bodies traveling in extended orbits, and predicted their return, were familiar with the length of the year, and divided it up into months and weeks, and the day into hours and minutes as now existing. The priests of Egypt gave astronomy a religious character; but their knowledge of the science is testified to only by their ancient zodiacs and the position of their pyramids with relation to the cardinal points. Among the Greeks astronomy took a markedly scientific form. Thales of Miletus (born 639 B.C.) predicted a solar eclipse, and his successors held opinions which are in many respects in accordance with modern ideas. Pythagoras (500 B.C.) is credited with promulgating the theory of the revolution of the planets about a central luminary. Great progress was made in astronomy under the Ptolemies, and we find Timochares and Aristyllus employed about 300 B.C. in making useful planetary observations. But Aristarchus of Samos (born 267 B.C.) is said, on the authority of Archimedes, to have far surpassed them, by developing a genuine heliocentric system, which, however, had scant recognition. A hundred years later Hipparchus determined more exactly the length of the solar year, the eccentricity of the ecliptic, the precession of the equinoxes, and even undertook a catalogue of the stars. It was in the second century after Christ that Claudius Ptolemy, a famous mathematician of Pelusium in Egypt, propounded the system that bears his name, viz., that the earth was the center of the universe, and that the sun, moon, and planets revolved around it in the following order: nearest to the earth was the sphere of the moon; then followed the spheres of Mercury, Venus, the Sun, Mars, Jupiter, and Saturn; then came the sphere of the fixed stars. In the *Almagest* Ptolemy developed at length his particular theories of astronomy, which were accepted by the scientific world until they were replaced by those of Copernicus. Ptolemy's labors were of vast importance to the advancement of the science. The Arabs began to make scientific astronomical observations about the middle of the eighth century, and for 400 years they prosecuted the science with assiduity. Ibn-Yunis (1000 A.D.) compiled the Hakimite Tables of the planets and recorded with accuracy two solar eclipses. In the sixteenth century Nicholas Copernicus, born in 1473, introduced the system that bears his name, and which gives to the sun the central place in the solar system, with the planetary bodies, the earth included, revolving around it. This arrangement of the universe (see *Copernicus*) came at length to be generally received as a result of later research and on account of the simplicity it substituted for the complexities and contradictions of the theory of Ptolemy. The observations and calculations of Tycho Brahe, a Danish astronomer, born in 1546, continued over many years, were of the highest value, and claim for him the title of regenerator of practical astronomy. His assistant and pupil, Kepler, born in 1571, was enabled, principally by the aid he received from his master's labors, to arrive at those laws which have made his name famous: 1. That the planets move, not in circular, but in elliptical orbits, of which the sun occupies a focus. 2. That the radius vector, or imaginary straight line joining the sun and any planet, moves over equal spaces in equal times. 3. That the squares of the times of the revolutions of the planets are as the cubes of their mean distances from the sun. Galileo, who died in 1642, advanced the science by his observations and by the new revelations he made through his possession of the telescope, which established the truth of the Copernican theory. Newton, born in 1642, carried physical astronomy far forward. Accepting Kepler's laws as a

statement of the facts of planetary motion he deduced from them his theory of gravitation. The science was enriched towards the close of the eighteenth century by the discovery by Herschel of the planet Uranus and its satellites, the resolution of the Milky Way into myriads of stars, and the unraveling of the mystery of nebulæ and of double and triple stars. The splendid analytical researches of Lalande, Lagrange, Delambre, and Laplace mark the same period. The nineteenth century opened with the discovery of the first four minor planets; and the existence of another planet (Neptune) more distant from the sun than Uranus, was, in 1846, simultaneously and independently predicted by Leverrier and Adams. Of late years the sun has attracted a number of observers, the spectroscope and photography having been specially fruitful in this field of investigation. From recent transit observations the distance of the sun has been corrected, and is now given as a little less than 93,000,000 miles. An interesting recent discovery is that of two satellites of Mars, and of new, minute satellites of Saturn and Jupiter. Much valuable work has of late been accomplished in ascertaining the parallax of fixed stars.

The objects with which astronomy has chiefly to deal are the earth, the sun, the moon, the planets, the fixed stars, comets, nebulæ, and meteors. The stellar universe is composed of an unknown host of stars, many millions in number, the most noticeable of which have been formed into groups called *constellations*. The nebulæ are cloud-like patches of light scattered all over the heavens. Some of them have been resolved into star-clusters, but many of them are apparently masses of incandescent gas. The fixed stars preserve, at least to unaided vision, an unalterable relation to each other, because of their vast distance from the earth. The distance of only a few of them has been discovered, the nearest, Alpha Centauri, being 25 trillions of miles from the earth. Their apparent movement from east to west is the result of the earth's revolution on its axis in twenty-four hours from west to east. The planets have not only an apparent, but also a real and proper motion, since, like our earth, they revolve around the sun in their several orbits and periods. The nearest of these bodies to the sun—unless the hypothetical *Vulcan* really exists—is *Mercury*. *Venus*, the second planet from the sun, is the brightest and most beautiful of all the plantes. The *Earth* is the first planet accompanied by a satellite or moon. *Mars*, the next planet, has two satellites, as already mentioned. Its surface has a variegated character, and the existence of land, water, snow, and ice has been assumed. The *Asteroids*, of which over 700 have been observed, form a broad zone of small bodies circulating in the space between Mars and Jupiter. *Jupiter*, the largest planet of the system, has eight satellites, four discovered by Galileo, a fifth in 1892, two in 1904, and the eighth in 1908. *Saturn*, with his ten moons, and his broad thin rings with edges turned towards the planet, is, perhaps, the most striking telescopic object in the heavens. *Urănus*—discovered by Herschel in 1781—is accompanied by four satellites. *Neptune*, the farthest removed from the sun, has one satellite, the motion of which is retrograde. Besides the planets, quite a number of comets are known to be members of the solar system. The physical constitution of these bodies is still one of the enigmas of astronomy. The observation of meteors has recently attracted much attention. They most frequently occur in the autumn, and have been supposed to be the débris of comets. See articles *Earth*, *Sun*, *Moon*, *Planet*, *Comet*, *Stars*, *Mercury*, *Venus*, *Mars*, *Jupiter*, *Saturn*, *Asteroids*, etc.

Astur. See *Goshawk.*

Asturia (as-tö′ri-a) or THE ASTURIAS, a Spanish principality, now forming the province of Oviedo, on the north coast of Spain; an Alpine region, with steep and jagged mountain ridges, valuable minerals, luxuriant grazing lands, and fertile, well-watered valleys. The hereditary prince of Spain has borne since 1388 the title of Prince of the Asturias.

Astyages (as-tī′a-jēz), last king of the Medes, 593–558 B.C., deposed by Cyrus, an event which transferred the supremacy from the Medes to the Persians.

Asuncion (å-sun-thē-on′) or NUESTRA SENORA DE LA ASUNCION (English, *Assumption*), the chief city of Paraguay, on the river Paraguay, picturesquely situated and with good public buildings. It was founded in 1536 on the feast of the Assumption. Its trade is mostly in the Paraguay tea, hides, tobacco, oranges, etc. It was taken and plundered by the Brazilians in 1869, and some of the leading buildings still remain in a half-ruined condition. A railway runs for a short distance into the interior. Pop. 31,719.

Aswail (as-wāl), native name for the sloth-bear (*Melursus labiātus*)

of the mountains of India, an uncouth, unwieldy animal, with very long black hair, inoffensive when not attacked. Its usual diet consists of roots, bees' nests, grubs, snails, ants, etc. Its flesh is in much favor as an article of food. When captured young it is easily tamed.

Asylum (a-sī'lum), a sanctuary or place of refuge, where criminals and debtors sheltered themselves from justice, and from which they could not be taken without sacrilege. Temples were anciently asylums, as were Christian churches in later times. (See *Sanctuary.*) The term is now usually applied to an institution for receiving, maintaining, and, so far as possible, ameliorating the condition, of persons laboring under certain bodily defects or mental maladies; sometimes also a refuge for the unfortunate.

Asymptote (as'im-tōt), in geometry, a line which is continually approaching a curve, but never meets it, however far either of them may be prolonged. This may be conceived as a tangent to a curve at an infinite distance.

Asyndeton (a-sin'de-ton), a figure of speech by which connecting words are omitted; as 'I came, saw, conquered.'

Atacama (ä-tä-kä'mä), a desert region on the west coast of S. America belonging to Chile, comprised partly in the prov. of Atacama, partly in the territory of Antofagasta. It mainly consists of a plateau extending from Copiapó northward to the river Loa, and lies between the Andes and the sea. It forms the chief mining district of Chile, there being here rich silver mines, while gold is also found, as well as argentiferous lead, copper, nickel, cobalt, and iron; with guano on the coast. In its elevated parts saline, borax, and nitrate deposits occur. The northern portion till recently belonged to Bolivia. The Chilean prov. of Atacama has an area of 28,350 sq. miles and a pop. of 71,446.

Atacamite (ä-tä-kä'mīt), a mineral consisting of a combination of the protoxide and chloride of copper, occurring abundantly in some parts of South America, as at Atacama, whence it has its name. It is worked as an ore in South America, and is exported to England.

Atahualpa (ä-tä-hwäl'pä), the last of the Incas, succeeded his father in 1529 on the throne of Quito, while his brother Huascar obtained the Kingdom of Peru. They soon made war against each other, when the latter was defeated, and his kingdom fell into the hands of Atahualpa. The Spaniards, taking advantage of these internal disturbances, with Pizarro at their head, invaded Peru, and advanced to Atahualpa's camp. Here, while Pizarro's priest was telling the Inca how the pope had given Peru to the Spaniards, fire was opened on the unsuspecting Peruvians, Atahualpa was captured, and, despite the payment of a vast ransom in gold, was executed (1533).

Atalanta (at-a-lan'ta), in the Greek mythology, a Bœotian heroine famed for running. She was to be obtained in marriage only by him who could outstrip her in a race, the consequence of failure being death. One of her suitors, Hippomenes, obtained from Aphrodītē (Venus) three golden apples, which he threw behind him, one after another, as he ran. Atalanta stopped to pick them up, and was, not unwillingly, defeated. There was another Atalanta belonging to Arcadia, who cannot very well be distinguished, the same stories being told about both.

Ataman. See *Hetman.*

Atavism (at'a-vizm; L. *atăvus*, an ancestor), in biology, the tendency to reproduce the ancestral type in animals or plants which have become considerably modified by breeding or cultivation; the reversion of a descendant to some peculiarity of a more or less remote ancestor.

Ataxy (a-tak'si), ATAXIA, in medicine, irregularity in the animal functions, or in the symptoms of a disease. See *Locomotor ataxy.*

Atbara (ät-bär'ä), the most northerly tributary of the Nile. It rises in the Abyssinian highlands, receives several large tributaries, and enters the Nile 17° 50′ N.

Atchafalaya (atch-af-a-lī-a; 'Lost Water'), a river of the United States, an outlet of the Red River which strikes off before the junction of that river with the Mississippi, flows southward, and enters the Gulf of Mexico by Atchafalaya Bay. Its length is about 220 miles, nearly all navigable.

Atcheen'. See *Acheen.*

Atchison (atch'is-son), a city of Kansas, capital of Atchison Co., on the Missouri River, 21 miles above Leavenworth. It was founded in 1854; is an important commercial city, having a very large shipping trade in grain, flour, and livestock and an extensive lumber trade. It has large flour mills, and many other manufactures. Here are several collegiate institutions

and a State soldiers' orphans' home. Pop. (1910) 16,429; (1920) 12,630.

Ate, among the Greeks, the goddess of hate, injustice, crime, and retribution, daughter of Zeus according to Homer, but of Eris (Strife) according to Hesiod.

Ateles (at'e-lēz), a genus of American monkeys. See *Spider-monkey.*

Atellanæ Fabulæ (a-tel-ā'nē fab'ū-lē; called also *Oscan plays*), a kind of light interlude, in ancient Rome, performed not by the regular actors, but by freeborn young Romans; it originated from *Atella*, a city of the Oscans.

Ateshga (at-esh'ga; the place of fire), a sacred place of the Guebres or Persian fire-worshipers, on the peninsula of Apsheron, on the W. coast of the Caspian, visited by large numbers of pilgrims, who bow before the sacred flames which issue from the bituminous soil.

Ath (ät), a fortified town of Belgium, in the province of Hainaut, on the Dender; it carries on weaving, dyeing, and printing of cottons. Pop. (1904) 11,201.

Athabasca (ath-a-bas'ka), a river, lake, and former district of Canada. The ATHABASCA river rises on the eastern slopes of the Rocky Mountains in the district of Alberta, flows in a N. E. direction through the district of the same name, and falls into Lake Athabasca after a course of about 600 miles.—LAKE ATHABASCA, lat. 59° N., long. 110° W., is about 190 miles S. S. E. of the Great Slave Lake, with which it is connected by means of the Slave River, a continuation of the Peace. It is about 200 miles in length from east to west, and about 35 miles wide at the broadest part, but gradually narrows to a point at either extremity.—The district of ATHABASCA, formed in 1882, lay immediately E. of British Columbia and N. of Alberta; area about 251,000 sq. miles. It was in 1905 almost equally divided between the two new provinces of Alberta and Saskatchewan. Large quantities of free gold have been discovered on the Albert route, 700 miles from Prince Albert, and successfully worked.

Athaliah (ath-a-lī'a), daughter of Ahab, King of Israel, and wife of Jehoram, King of Judah. After the death of her son Ahaziah she opened her way to the throne by the murder of forty-two princes of the royal blood. She reigned six years; in the seventh the high-priest Jehoiada placed Joash, the young son of Ahaziah, who had been secretly preserved, on the throne of his father, and Athaliah was slain. See II Kings, viii, ix, xi.

Athanasian (a-tha-nā'shan) CREED, a creed or exposition of Christian faith, supposed formerly to have been drawn up by St. Athanasius, though this opinion is now generally rejected, and the composition often ascribed to Hilary, Bishop of Arles (about 430). It is an explicit avowal of the doctrines of the Trinity (as opposed to Arianism, of which Athanasius was an active opponent) and of the incarnation, and contains what are known as the 'damnatory clauses,' in which it declares that damnation must be the lot of those who do not believe the true and catholic faith. It is retained in the Greek, Roman and English services, but not in the American Book of Common Prayer.

Athanasius, ST., Bishop of Alexandria, a renowned father of the church, born in that city about A.D. 296; died 373. While yet a young man he attended the council at Nice (325), where he gained the highest esteem of the fathers by the talents which he displayed in the Arian controversy. He had a great share in the decrees passed here, and thereby drew on himself the hatred of the Arians. Shortly after this event he was appointed Bishop of Alexandria. The complaints and accusations of his enemies at length induced the Emperor Constantine to summon him in 335 before the council of Tyre, when he was suspended, and soon afterwards banished to Treves, in Gaul. The death of Constantine put an end to this banishment, and Constantine II permitted him to return. He was deposed again in 339, and was reinstated in 346. Again in 356 he was sentenced to be banished, when he retired into those desert parts of Upper Egypt, in whose solitudes numerous monasteries and hermitages had sprung up under the zealous promotion of Athanasius himself; and among these he seems to have found refuge. Here he composed many writings which were full of eloquence, to strengthen the faith of the believers or expose the falsehood of his enemies. When Julian the Apostate ascended the throne toleration was proclaimed to all religions, and Athanasius returned to his former position at Alexandria. His next controversy was with the heathen subjects of Julian, who excited the emperor against him, and he was obliged to flee in order to save his life. The death of the emperor and the accession of Jovian (363) again brought him back; but Valens becoming emperor, and the Arians recovering the superiority, he was once more compelled to flee. He

remained concealed this time for four months, at the end of which period of exile Valens allowed him to return. From this period he remained undisturbed in his office till he died. Of the forty-six years of his official life he spent twenty in banishment, and the greater part of the remainder in defending the Nicene Creed. His writings, which are in Greek, are on polemical, historical, and moral subjects. The polemical treat chiefly of the doctrines of the Trinity, the incarnation of Christ, and the divinity of the Holy Spirit. The historical ones are of the greatest importance for the history of the church. See *Athanasian Creed.*

Atheism (ā′thē-izm; Greek, *a*, priv., and *Theos*, God), the disbelief of the existence of a God or supreme intelligent being; the doctrine opposed to *theism* or *deism*. The term has been often loosely used as equivalent with *infidelity* generally, with deism, with pantheism, and with the denial of immortality.

Atheling (ath′el-ing), a title of honor among the Anglo-Saxons, meaning one who is of noble blood. The title was gradually confined to the princes of the blood royal, and in the ninth and tenth centuries is used exclusively for the sons or brothers of the reigning king.

Atheling, EDGAR. See *Edgar Atheling.*

Athelney (ath′el-ni), formerly an island in the midst of fens and marshes, now drained and cultivated, in Somersetshire, England, about 7 miles southeast of Bridgewater. Alfred the Great took refuge in it during a Danish invasion, and afterwards founded an abbey there.

Athelstan (ath′el-stan), King of England, born 895; died 940, succeeded his father, Edward the Elder, in 925. He was victorious in his wars with the Danes of Northumberland, and the Scots, by whom they were assisted. After a signal overthrow of his enemies at Brunanburgh he governed in peace and with great ability.

Athena, or ATHENE (a-thē′na, a-thē′nē), a Greek goddess, identified by the Romans with Minerva, the representative of the intellectual powers; the daughter of Zeus (Jupiter) and Mētis (that is, wisdom or cleverness). According to the legend, which is perhaps allegorical, before her birth Zeus swallowed her mother, and Athena afterwards sprang from the head of Zeus with a mighty war shout and in complete armor. In her character of a wise and prudent warrior she was contrasted with the fierce Ares (Mars). In the wars of the giants she slew Pallas and Enceladus. In the wars of the mortals she aided and protected heroes. She is also represented as the patroness of the arts of peace. The sculptor, the architect, and the painter, as well as the philosopher, the orator, and the poet, considered her their tutelar deity. She is also represented among the healing gods. In all these representations she is the symbol of the thinking faculty, the goddess of wisdom, science, and art; the latter, however, only in so far as invention and thought are comprehended. In the images of the goddess a manly gravity and an air of reflection are united with female beauty in her features. As a warrior she is represented completely armed, her head covered with a gold helmet. As the goddess of peaceful arts she appears in the dress of a Grecian matron. To her insignia belong the Ægis, the Gorgon's head, the round Argive buckler; and the owl, the cock, the serpent, an olive branch, and a lance were sacred to her. All Attica, but particularly Athens, was sacred to her, and she had numerous temples there. Her most brilliant festival at Athens was the Panathenæa.

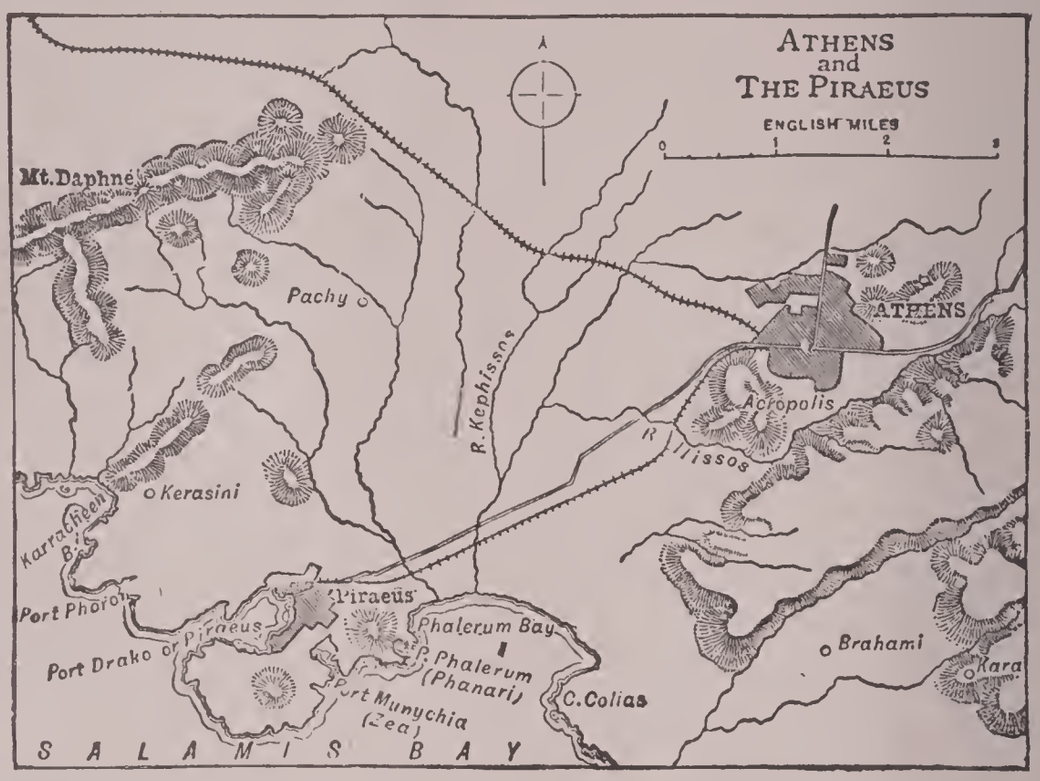
Athenæum (ath-e-nē′um), the temple of Athena, or Minerva, at Athens, frequented by poets, learned men, and orators. The same name was given at Rome to the school which Hadrian established on the Capitoline Mount for the promotion of literary and scientific studies. In modern times the same name is given to literary clubs and establishments connected with the sciences.

Athenæus (ath-e-nē′us), a Greek rhetorician and grammarian, who lived at the end of the second and beginning of the third century after Christ, author of an encyclopedic work, in the form of conversation, called *Discussions on Dinners*, etc., (*Deipnosophistæ*), which is a rich but ill-arranged treasure of historical, antiquarian, philosophical, grammatical, etc., knowledge.

Athenagoras (ath-en-ag′or-as), a Platonic philosopher of Athens, a convert to Christianity, who wrote a Greek Apology for the Christians, addressed to the Emperor Marcus Aurelius, in 177, one of the earliest that appeared.

Ath′ens (Gr. *Athēnai*, L. *Athenæ*), anciently the capital of Attica and center of Greek culture, now the capital of the Kingdom of Greece. It is situated in the central plain of Attica, about 4 miles from the Saronic Gulf or Gulf of Ægina, an arm of the Ægean Sea running in between the mainland and

the Peloponnesus. It is said to have been founded about 1550 B. C. by Cecrops, the mythical Pelasgian hero, and to have boundary as the sites of its chief public buildings, the city itself, however, afterwards taking a northerly direction. On



borne the name Cecropia until under Erechtheus it received the name of Athens, in honor of Athēnē. The Acropolis, an irregular oval crag 500 ft. high, with a level summit 1000 ft. long by 500 in breadth, was the original nucleus of the east ran the Ilissus and on the west the Cephissus, while to the southwest lay three harbors—Phalerum, the oldest and nearest; the Piræus, the most important; and Munychia, the Piræan Acropolis.

The architectural development of Athens

The Acropolis at Athens

the city. The three chief eminences near the Acropolis—the Areopagus to the northwest, the Pnyx to the southwest, and the Museum to the south of the Pnyx —were thus included within the city may be dated from the rule of the Pisistratids (560-510 B. C.), who are credited with the foundation of the huge temple of the Olympian Zeus, completed by Hadrian seven centuries later, the erection of the

Pythium or temple of Pythian Apollo, and of the Lyceum or temple of Apollo Lyceus —all near the Ilissus.

With the foundation of Athenian democracy under Cisthenes, the Pnyx or place of public assembly, with its semicircular area and cyclopean wall, first became of importance, and a commencement was made to the Dionysiac theater (theater of Dionysus or Bacchus) on the south side of the Acropolis.

Shortly after the destruction wrought by the Persians in 480 B. C. Themistocles reconstructed the city upon practical lines and with a larger area, inclosing the city in new walls 7½ miles in circumference, erecting the north wall of the Acropolis, and developing the maritime resources of the Piræus; while Cimon added to the southern fortifications of the Acropolis, placed on it the temple of Nike Apteros, planted the Agora with trees, laid out the Academy, and built the Theseum on an eminence north of the Areopagus. Here were the Leucorium, and the far-famed Stoa Poecilē, a hall with walls covered with paintings (whence the *Stoics* got their name). Under Pericles the highest point of artistic development was reached. An Odeium was erected on the east of the Dionysiac theater for the recitations of rhapsodists and musicians; and with the aid of the architects Ictīnus and Mnesicles and of the sculptor Phidias the work on the Acropolis was perfected. Covering the whole of the western end rose the Propylæa, of Pentelic marble and consisting of a central portico with two wings in the form of Doric temples. Within, to the left of the entrance, stood the bronze statue of Athena Promachus, and beyond it the Erechtheum, containing the statue of Athena Polias; while to the right, on the highest part of the Acropolis, was the marble Parthenon or temple of Athena, the crowning glory of the whole. Minor statues and shrines occupied the rest of the area, which was for the time wholly appropriated to the worship of the guardian deities of the city. In the interval between the close of the Peloponnesian war and the battle of Chæronea few additions were made. Then, however, the long walls and Piræus, destroyed by Lysander, were restored by Conon, and under the orator Lycurgus the Dionysiac temple was completed, the Panathenaic stadium commenced, and the choragic monuments of Lysicrates and Thrasyllus erected. Later on Ptolemy Philadelphus gave it the Ptolemæum near the Theseum, Attalus I the stoa northeast of the Agora, Eumenes II that near the great theater, and Antiochus Epiphanes carried on the Olympium. Under the Romans it continued a flourishing city, Hadrian in the second century adorning it with many new buildings. Indeed Athens was at no time more splendid than under the Antonines, when Pausanias visited and described it. But after a time Christian zeal, the attacks of barbarians, and robberies of collectors made sad inroads among the monuments. About 420 A.D. paganism was totally annihilated at Athens, and when Justinian closed even the schools of the philosophers, the reverence for buildings associated with the names of the ancient deities and heroes was lost. The Parthenon was turned into a church of the Virgin Mary, and St. George stepped into the place of Theseus. Finally, in 1456, the place fell into the hands of the Turks. The Parthenon became a mosque, and in 1687 was greatly damaged by an explosion at the siege of Athens by the Venetians. Enough however, remains of it and of the neighboring structures to abundantly attest the splendor of the Acropolis; while of the other buildings of the city, the Theseum and Horologium, or Temple of the Winds, are admirably preserved, as also are the Pnyx, Panathenaic stadium, etc. Soon after the commencement of the war of liberation in 1821 the Turks surrendered Athens, but captured it again in 1826–27. It was then abandoned until 1830. In 1835 it became the royal residence, and made rapid progress. The modern city mostly lies northwards and eastwards from the Acropolis, and consists mainly of straight and well-built streets. Among the principal buildings are the royal palace, a stately building with a façade of Pentelic marble (completed 1843), the university, the academy, public library, theater, and observatory. The university was opened in 1836, and has 1400 students. There are valuable museums, in particular the National Museum and that in the Polytechnic School, which embraces the Schliemann collection, etc. These are constantly being added to by excavations. There are four foreign archæological schools or institutes, the French, German, American, and British. The vast stadium, or racecourse, has recently been rebuilt in magnificent style, the material being Pentelic marble. In 1906 the athletic games of ancient Greece were resumed in this new stadium, including the famous Marathon runs. Pop. 167,479.

Athens, a city, county seat of Clarke Co., Georgia, on the Oconee River, 70 miles E. N. E. of Atlanta, with several cotton mills and various manufac

tures. Home of the University of Georgia, State College of Agriculture, and State Normal School. Pop. 16,748.

Athens, a city, county seat of Athens Co., Ohio, on Hocking River, 63 miles S. E. of Columbus, in a coal-mining region. It has manufactures of furniture, brick, caskets, etc. Home of the University of Ohio. Pop. 6418.

Atheroma cysted tumor containing (ath-ėr-ō′ma), a soft encheesy matter. The term is applied to fatty degeneration of the inner coat of the arteries.

Atherstone (ath′er-stōn), a town in Warwickshire, England, the reputed birthplace of the poet Drayton.

Atherton (ath′er-ton), a town of England, Lancashire, 13 miles N. W. of Manchester; has cotton factories, collieries, iron-works, etc. Pop. 16,211.

Atherton, GERTRUDE F., author; born at San Francisco, California. Has written many novels, including *The Doomswoman; His Fortunate Grace; Senator North; The Aristocrats; The Conqueror*—this dealing with the career of Alexander Hamilton.

Athletes (ath′lēts; Gr. *athlētai*), combatants who took part in the public games of Greece. The profession was an honorable one; tests of birth, position and character were imposed, and crowns, statues, special privileges, and pensions were among the rewards of success.—*Athletic sports*, if they do not hold such an honorable position to-day as they did in antiquity, are still practised with great enthusiasm and excite the keenest interest in their patrons. Among them are running, jumping, rowing, swimming, cycling, cricket, baseball, football, wrestling, throwing the hammer, putting the shot, etc.

Athlone (ath-lōn′), a town of Ireland, divided by the Shannon into two parts, one in Westmeath, the other in Roscommon; about 76 miles west of Dublin. Its central position has made it one of the chief military depôts, and four railways meet. Pop. 7472.

Athol (ath′ol), a town of Worcester Co., Massachusetts, 28 miles N. W. of Worcester. It has manufactures of mechanical tools, boots, shoes, furniture, etc. Pop. (1920) 9792.

Athol, or ATHOLE, a mountainous and romantic district in the north of Perthshire, Scotland, giving the title to a duke of the Murray family.

Athor (ä′thōr), HATHOR, or HET-HER, an Egyptian goddess, identified with Aphroditē or Venus. Her symbol was the cow bearing on its head the solar disc and hawk-feather plumes. She had a great number of local forms and names, and is often confounded with Isis, whose symbol was likewise the solar disc.

Athos (ath′os; now *Hagion Oros* or *Monte Santo* (that is, Holy Mountain), a mountain 6700 feet high, in Northern Greece, terminating the most eastern of the three peninsulas jutting into the Archipelago. The name, however, is frequently applied to the whole peninsula, which is about 30 miles long by 5 broad. It is covered with forests, and plantations of olive, vine, and other fruit trees. Both the surface and coastline are irregular. The Persian fleet under Mardonius was wrecked here in 492 B. C., and to avoid a similar calamity Xerxes caused a canal, of which traces may yet be seen, to be cut through the isthmus that joins the peninsula to the mainland. On the peninsula there are situated about twenty monasteries and a multitude of hermitages, which contain from 6000 to 8000 monks and hermits of the order of St. Basil. The libraries of the monasteries are rich in literary treasures and manuscripts. Every nation belonging to the Greek Church has here one or more monasteries of its own, which are annually visited by pilgrims. The various religious communities form a species of republic, some of them being ruled by abbots chosen for life; others have a board of overseers elected for a term of years. In the fifteenth century Mount Athos passed from control of the Greek emperors of Byzantium to the Turks and was restored to Greece in 1912 as a result of the Balkan war (q. v.).

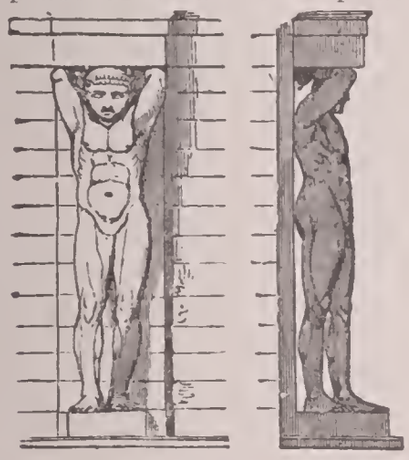
Athy (ath-ī′), a town in Ireland, county of Kildare, 37 miles southwest of Dublin, on the Barrow, which is here joined by the Grand Canal. Its chief trade is in corn. Pop. about 5000.

Atitlan (ä-tē′tlän), a lake and mountain of Central America in Guatemala. The lake is about 24 miles long and 10 broad; the mountain is an active volcano 12,160 ft. high. The lake has no visible outlet and is of great depth, no soundings being obtainable with a line of 1000 ft. Mineral springs abound in the neighborhood.

Atlanta (at-lan′ta), a city, capital of Georgia, on a ridge near the foothills of the Blue Ridge Mountains, 1050 feet above sea level, 8 miles E. of the Chattahoochee River, from which it derives its water supply and hydro-electric current. Served by 8 railroads and a number of belt lines, it carries on a large trade in grain, paper, cotton, flour, tobacco; and has 500 factories turning out more than 1000 varieties of goods, including syrups, vehicles, corrugated culverts, hats, shoes, overalls, furniture, terra cotta,

brushes, farm implements, rebuilt cars and locomotives, etc. Its educational institutions include Georgia School of Technology, Emory University, Oglethorpe University and Lanier University; Agnes Scott College, Cox College and Elizabeth Mather College (the last three for women) and 5 colleges for negroes. Pop. (1910) 154,839; (1920) 200,616.

Atlantes (at-lan'tēs), or TELAMŌNES, in architecture, male figures used in place of columns or pilasters for



Atlantes.

the support of an entablature or cornice. Female figures, *caryatides*.

Atlantic (at-lan'tik), capital of Cass Co., Iowa. It is the center of a wide agricultural region. Pop. 5329.

Atlantic City, a popular seaside resort of New Jersey, 60 miles S. E. of Philadelphia. It has 1000 hotels and boarding houses, accommodating 350,000 guests and a twelve-mile boardwalk along the sea. Pop. (1920) 50,682.

Atlantic Ocean, the vast expanse of sea lying between the west coasts of Europe and Africa and the east coasts of North and South America, and extending from the Arctic to the Antarctic Ocean; greatest breadth, between the west coast of Northern Africa and the east coast of Florida, 4150 miles; least breadth, between Norway and Greenland, 930 miles; superficial extent, 25,000,000 square miles. The principal inlets and bays are Baffin and Hudson Bays, the Gulf of Mexico, the Caribbean Sea, the North Sea or German Ocean, the Bay of Biscay, the Mediterranean Sea, and the Gulf of Guinea. The principal islands north of the equator are Iceland, the Faroe and British Islands, the Azores, Canaries, and Cape Verde Islands, Newfoundland, Cape Breton, and the West India Islands; and south of the equator, Ascension, St. Helena, and Tristan da Cunha.

The great currents of the Atlantic are the Equatorial Current (divisible into the Main, Northern, and Southern Equatorial Currents), the Gulf-stream, the North African and Guinea Current, the Southern Connecting Current, the Southern Atlantic Current, the Cape Horn Current, Rennel's Current, and the Arctic Current. The current system is primarily set in motion by the trade-winds which drive the water of the inter-tropical region from Africa towards the American coasts. The main Equatorial Current, passing across the Atlantic, is turned by the South American coast, along which it runs at a rate of 30 to 50 miles a day, till, having received part of the North Equatorial Current, it enters the Gulf of Mexico. Issuing thence between Florida and Cuba under the name of the Gulf-stream, it flows with a gradually expanding channel nearly parallel to the coast of the United States. It then turns northeastward into the mid-Atlantic, the larger proportion of it passing southward to the east of the Azores to swell the North African and Guinea Current created by the northerly winds off the Portuguese coast. The Guinea Current, which takes a southerly course, is divided into two on arriving at the region of the northeast trades, part of it flowing east to the Bight of Biafra and joining the South African feeder of the Main Equatorial, but the larger portion being carried westward into the North Equatorial drift. Rennel's Current, which is possibly a continuation of the Gulf-stream, enters the Bay of Biscay from the west, curves round its coast, and then turns northwest towards Cape Clear. The Arctic Current runs along the east coast of Greenland (being here called the Greenland Current), doubles Cape Farewell, and flows up towards Davis Strait; it then turns to the south along the coasts of Labrador and the United States, from which it separates the Gulf-stream by a cold band of water. Immense masses of ice are borne south by this current from the polar seas. In the interior of the North Atlantic there is a large area comparatively free from currents, called the Sargasso Sea, from the large quantity of sea weed (of the genus *Sargassum*) which drifts into it. A similar area exists in the South Atlantic. In the South Atlantic, the portion of the Equatorial Current which strikes the American coast below Cape St. Roque flows southward at the rate of from 12 to 20 miles a day along the Brazil coast under the name of the Brazil Current. It then turns eastward and forms the South Connecting Current, which, on reaching the South African coast, turns north-

ward into the Main and Southern Equatorial Currents. Besides the surface currents, an under current of cold water flows from the poles to the equator, and an upper current of warm water from the equator towards the poles.

The greatest depth yet discovered is north of Porto Rico, in the West Indies, namely 27,360 feet. Cross-sections of the North Atlantic between Europe and America show that its bed consists of two great valleys lying in a north-and-south direction, and separated by a ridge, on which there is an average depth of 1600 or 1700 fathoms, while the valleys on either side sink to the depth of 3000 or 4000 fathoms. A ridge, called the *Wyville-Thomson Ridge*, with a depth of little more than 200 fathoms above it, runs from near the Butt of Lewis to Iceland, cutting off the colder water of the Arctic Ocean from the warmer water of the Atlantic. The South Atlantic, of which the greatest depth yet found is over 3000 fathoms, resembles the North Atlantic in having an elevated plateau or ridge in the center with a deep trough on either side. The saltness and specific gravity of the Atlantic gradually diminish from the tropics to the poles, and also from within a short distance of the tropics to the equator. There is yet much to be discovered regarding the salinity of the water below the surface of both the North and South Atlantic. The North Atlantic is the greatest highway of ocean traffic in the world. It is also a great area of submarine communication, by means of the telegraphic cables that are laid across its bed.

Atlantides (at-lan′ti-dēz), a name given to the Pleiades, which were fabled to be the seven daughters of Atlas or of his brother Hesperus.

Atlantis (at-lan′tis), an island which, according to Plato, existed in the Atlantic over against the Pillars of Hercules (Straits of Gibraltar), was the home of a great nation and was finally swallowed up by the sea. The legend has been accepted by some as fundamentally true; but others have regarded it as the outgrowth of some early discovery of the New World.

Atlantosaurus (at-lan′tō-sạ-rus), a gigantic fossil reptile, order Dinosauria, obtained in the upper Jurassic strata of the Rocky Mountains, attaining a length of 80 feet or more.

At′las, an extensive mountain system in North Africa, starting near Cape Nun, on the Atlantic Ocean, traversing Morocco, Algiers, and Tunis, and terminating on the coast of the Mediterranean; divided generally into two parallel ranges, running W. to E., the Greater Atlas lying towards the Sahara and the Lesser Atlas towards the Mediterranean. The principal chain is about 1500 miles long, and the principal peaks rise above or approach the line of perpetual congelation, some of the mountain tops in Morocco rising to a height of over 14,000 feet. Silver, antimony, lead, copper, iron, etc., are among the minerals. The vegetation is chiefly European in character, except on the low grounds and next the desert. Dense forests exist on the northern slopes, while the southern flanks are mainly destitute of vegetation.

Atlas, in Greek mythology, the name of a Titan whom Zeus condemned to bear the vault of heaven. The same name is given to a collection of maps and charts, and was first used by General Mercator in the sixteenth century, the figure of Atlas bearing the globe being given on the title-pages of such works.

Atlas, in anatomy, is the name of the first vertebra of the neck, which supports the head. It is connected with the occipital bone in such a way as to permit of the nodding movement of the head, and rests on the second vertebra or *axis*, their union allowing the head to turn from side to side.

Atmidometer (at-mi-dom′e-tėr), an instrument for measuring the evaporation from water, ice, or snow. It somewhat resembles Nicholson's hydrometer, being constructed so as to float in water and having an upright graduated stem, on the top of which is a metal pan. Water, ice, or snow is put into the pan, so as to sink the zero of the stem to a level with the cover of the vessel, and as evaporation goes on the stem rises, showing the amount of evaporation in grains.

Atmometer (at-mom′e-tėr), an instrument for measuring the amount of evaporation from a moist surface in a given time. It is often a thin hollow ball of porous earthenware in which is inserted a graduated glass tube. The cavity of the ball and tube being filled with water and the top of the tube closed, the instrument is exposed to the free action of the air; the relative rapidity with which the water transuding through the porous substance is evaporated is marked by the scale on the tube as the water sinks.

Atmosphere (at′mos-fēr), primarily the gaseous envelope which surrounds the earth; but the term is applied to that of any orb. The atmosphere of the earth consists of a mass of gas extending to a height which has been variously estimated at from 45 to several hundred miles, possibly 500, and bearing

on every part of the earth's surface with a pressure of about 15 (14.73) lbs. per square inch. The existence of this atmospheric pressure was first proved by Torricelli, who thus accounted for the rush of a liquid to fill a vacuum, and, working out the idea produced the first barometer. The average height of the mercurial column counterbalancing the atmospheric weight at the sea-level is a little less than 30 inches; but the pressure varies from hour to hour, and, roughly speaking, diminishes geometrically with the arithmetical increase in altitude. Of periodic variations there are two maxima of daily pressure occurring, when the temperature is about the mean of the day, and two minima, when it is at its highest and lowest, respectively; but the problems of diurnal and seasonal oscillations have yet to be fully solved, The pressure upon the human body of average size is no less than 14 tons, but as it is exerted equally internally and externally no inconvenience is caused by it. It is customary to take the atmospheric pressure as the standard for measuring other fluid pressures; thus the steam pressure of 30 lbs. per square inch on a boiler is spoken of as a pressure of two atmospheres.

The atmosphere, first subjected to analysis by Priestley and Scheele in the latter part of the eighteenth century, consists essentially of a mixture of oxygen and nitrogen in the almost constant proportion of 20.81 volumes of oxygen to 79.19 volumes of nitrogen, or, by weight, 23.01 parts of oxygen to 76.99 of nitrogen. The gases are associated together, not as a chemical compound, but as a mechanical mixture. Upon the oxygen present depends the power of the atmosphere to support combustion and respiration, the nitrogen acting as a diluent to prevent its too energetic action. Besides these gases, the air contains a small but constant percentage of carbonic acid gas, essential to plant life, also variable quantities of aqueous vapor and ozone, with minute amounts of argon and some other gases.

It also has ozone, traces of ammonia, and, in towns, sulphuretted hydrogen and sulphurous acid gas. After thunderstorms, nitric acid is also observable. In addition to its gaseous constituents the atmosphere is charged with minute particles of organic and inorganic matter.

Atmospheric Electricity, the electricity manifested by the atmosphere, and made sensibly observable in the lightning flash.

Atmospheric Engine. See *Air-engine.*

Atmospheric Railway, so called in consequence of the motive power being derived from the expansive force of compressed air. The idea of thus obtaining motion was first suggested by the French engineer Papin, about 200 years ago. In 1810, and again in 1827, Mr. Medhurst published a scheme for 'propelling carriages through a close-fitting air-tight tunnel by forcing in air behind them'; and in 1825 a similar project was patented by Mr. Vallance, of Brighton. About 1835 Mr. H. Pinkus, an American residing in England, patented a pneumatic railway. The carriages were to travel on an open line of rails, along which a cast-iron tube of between 3 and 4 feet diameter was to be laid, having a longitudinal slit from 1 to 2 inches wide and closed by a flexible valve along its upper side, through which a connection could be formed between the leading carriage and a piston working within the tube. This method was improved by Messrs. Clegg and Samuda, who in 1840 tried some experiments on a portion of the West London Railway with sufficient success to induce the government to advance a loan to the Dublin and Kingstown Railway Company, for the construction of a pneumatic line from Kingstown to Dalkey. It was opened for passenger traffic at the end of 1843, and was worked for many months. The London and Croydon Company subsequently obtained powers for laying down an atmospheric railway by the side of their other line from London to Croydon, and in experimental trips in 1845 a speed of 30 miles an hour was obtained with sixteen carriages, and of 70 miles with six carriages. But during the intense heat of the summer of 1846 the iron tube frequently became so hot as to melt the composition which sealed the valve, and the line had to be worked by locomotives. The mechanical difficulty of commanding a sufficient amount of rarefaction led to the abandonment of the system for railway purposes. An analogous system is now in use for the conveyance of letters and parcels in towns by means of tubes of moderate diameter laid beneath the streets. See *Pneumatic Despatch.*

Atoll (at'ol, a-tol'), the Polynesian name for coral islands of the ringed type inclosing a lagoon in the center. They are found numerously in the Pacific in archipelagos, and are occasionally of large size. Suadiva Atoll is 44 miles by 34; Rimsky is 54 by 20. See *Coral.*

Atomic (a-tom'ik) THEORY, a theory as to the existence and properties of atoms (see *Atoms*); especially, in

chemistry, the theory accounting for the fact that in compound bodies the elements combine in certain constant proportions, by assuming that all bodies are composed of ultimate atoms, the weight of which is different in different kinds of

Bird's-Eye View of an Atoll

matter. It is associated with the name of Dalton, who systematized and extended the imperfect results of his predecessors. On its practical side the atomic theory asserts three *Laws of Combining Proportions:* (1) The law of Constant or Definite Proportions, teaching that in every chemical compound the nature and proportion of the constituent elements are definite and invariable; thus, water invariably consists of 8 parts by weight of oxygen to 1 part by weight of hydrogen; (2) The Law of Combination in Multiple Proportions, according to which the several proportions in which one element unites with another invariably bear towards each other a simple relation; thus 1 part by weight of hydrogen unites with 8 parts by weight of oxygen to form water, and with 16 parts (*i.e.*, 8×2) parts of oxygen to form peroxide of hydrogen; (3) The Law of Combination in Reciprocal Proportions, that the proportions in which two elements combine with a third also represent the proportions in which, or in some simple multiple of which, they will themselves combine; thus in olefiant gas hydrogen is present with carbon in the proportion of 1 to 6, and in carbonic oxide oxygen is present with carbon in the proportion of 8 to 6, being also the proportions in which hydrogen and oxygen combine with each other. The theory that these *proportional numbers* are, in fact, nothing else than the relative weights of atoms so far accounts for the phenomena that the existence of these laws might have been predicted by the aid of the atomic hypothesis long before they were actually discovered by analysis. In themselves, however, the laws do not prove the theory of the existence of ultimate particles of matter of a certain relative weight; and although many chemists, even without expressly adopting the atomic theory itself, have followed Dalton in the use of the terms *atom* and *atomic weight*, in preference to *proportion, combining proportion, equivalent*, and the like, yet in using the word *atom* it should be held in mind that it merely denotes the proportions in which elements unite. These will remain the same whether the atomic hypothesis which suggested the employment of the term be true or false. Dalton supposed that the atoms of bodies are spherical, and invented certain symbols to represent the mode in which he conceived they might combine together.

Atomic Weights. See *Chemistry.*

Atoms (at′oms), according to the hypothesis of some philosophers, the primary parts of elementary matter not further divisible. The principal theorists of antiquity upon the nature of atoms were Moschus of Sidon, Leucippus (510 B.C.), Democritus, Epicurus, and Lucretius. These philosophers explained all phenomena on the theory of the existence of atoms possessing various properties and motions, and are hence sometimes called *Atomists.* Among the moderns, Gassendi illustrated the doctrine of Epicurus. Descartes formed from this his system of the vortices. Newton and Boerhaave supposed that the original matter consists of hard, ponderable, impenetrable, inactive, and immutable particles, from the variety in the composition of which the variety of bodies originates. According to Boscovich, every atom is an indivisible point possessing position, mass, and potential force or capacity for attraction and repulsion. Sir W. Thomson (Lord Kelvin) recently offered the suggestion that atoms are vortices in an incompressible fluid; but he found this view inadmissible and the latest and most probable theory is that atoms consist of a large number of very minute rotating particles, known as electrons. Of these there are estimated to be as many as 1800 in the atom of hydrogen, the smallest known, and proportionate numbers in larger atoms, the electrons being all of one size. The theory is sustained by a number of suggestive facts and discoveries.

Atonement (a-tōn′ment), in Christian theology, the expiation of sin by the obedience and personal sufferings of Christ. The first explicit exposition of the evangelical doctrine of the

atonement is ascribed to Anselm, Archbishop of Canterbury, in 1093.

Atrato (ä-trä′tō), a river of S. America, in the northwest of Colombia, emptying itself by nine mouths into the Gulf of Darien; it is navigable by steamers of some size for 250 miles, and was long the subject of undertakings for establishing water communication between the Atlantic and Pacific.

Atrauli (a-trow′li), a town of India, N. W. Provinces, Aligarh district, clean, well built, and with a good trade. Pop. 14,374.

Atrebates (a-treb′a-tēz), ancient inhabitants of that part of Gallia, Belgica, afterwards called *Artois*. A colony of them settled in Britain, in a part of Berkshire and Oxfordshire.

Atrek (ä-trek′), a river of Asia, forming the boundary between Persia and the Russian Transcaspian territory, and flowing into the Caspian; length 250 miles.

Atreus (at′rūs), in Greek mythology, a son of Pelops and Hippodamīa, grandson of Tantălus and progenitor of Agamemnon. He succeeded Eurystheus, his father-in-law, as King of Mycēnæ, and in revenge for the seduction of his wife by his brother Thyestes gave a banquet at which the latter partook of the flesh of his own sons. Atreus was killed by Ægisthus, a son of Thyestes. The tragic events connected with this family furnished materials to some of the great Greek dramatists.

Atriplex (at′ri-pleks), a genus of plants, nat. order Chenopodiaceæ. See *Orache*.

Atrium (ā′tri-um), the entrance-hall and most important apartment of a Roman house, generally ornamented with statues, family portraits, and other pictures, and forming the reception-room for visitors and clients. It was lighted by the *compluvium*, an opening in the roof, towards which the roof sloped so as to throw the rain-water into a cistern in the floor called the *impluvium*.

In zoölogy the term is applied to the large chamber or 'cloaca' into which the intestine opens in the Tunicata.

Atropa (at′rō-pa), the nightshade genus of plants. See *Belladonna*.

Atrophy (at′rō-fi), a wasting of the flesh due to some interference with the nutritive processes. It may arise from a variety of causes, such as permanent, oppressive, and exhausting passions, organic disease, a want of proper food or of pure air, suppurations in important organs, copious evacuations of blood, saliva, semen, etc., and it is also sometimes produced by poisons, for example arsenic, mercury, lead, in miners, painters, gilders, etc. In old age the whole frame except the heart undergoes atrophic change, and it is of frequent occurrence in infancy as a consequence of improper, unwholesome food, exposure to cold, damp, or impure air, etc. Single organs or parts of the body may be affected irrespective of the general state of nutrition; thus local atrophy may be superinduced by palsies, the pressure of tumors upon the nerves of the limbs, or by artificial pressure, as in the feet of Chinese ladies.

Atropin, Atropine (at′rō-pin), a crystalline alkaloid obtained from the deadly nightshade (*Atrŏpa Belladonna*). It is very poisonous, and produces persistent dilatation of the pupil.

Atropos (at′rō-pos), the eldest of the Fates, who cuts the thread of life with her shears.

Attacapa Indians (ä-tak′a-pa), a tribe found on the borders of the Gulf of Mexico, in Louisiana and Texas. They were called Attacapas (man-eaters) by the Choctaws. After the cession of Louisiana to the United States in 1803 they became extinct.

Attaché (at′a-shā), a junior member of the diplomatic service attached to an embassy or legation.

Attachment (a-tach′ment), in law, the taking into the custody of the law the person or property of one already before the court, or of one whom it is sought to bring before it.—*Attachment of person.* A writ issued by a court of record, commanding the sheriff to bring before it a person who has been guilty of contempt of court, either in neglect or abuse of its process or of subordinate powers.—*Attachment of property.* A writ issued at the institution or during the progress of an action, commanding the sheriff or other proper officer to attach the property, rights, credits, or effects of the defendant to satisfy the demands of the plaintiff. The laws and practice concerning the attachment vary in different States.

Attack (a-tak′), the opening act of hostility by a force seeking to dislodge an enemy from its position. It is considered more advantageous to offer than to wait attack, even in a defensive war. The historic forms of attack are: 1. The parallel; 2. The form in which both the wings attack and the center is kept back; 3. The form in which the center is pushed forward and the wings kept back; 4. The famous oblique mode, dating at least from Epaminondas, and

employed by Frederick the Great, where one wing advances to engage, while the other is kept back, and occupies the attention of the enemy by pretending an attack. Napoleon preferred to mass heavy columns against an enemy's center. The forms of attack have changed with the weapons used. In the days of the pike heavy masses were the rule, but the use of the musket led to an extended battle-front to give effect to the fire. The nature of the attack depends upon the condition and position of the enemy, upon the purpose of the war, upon the time, place, and other circumstances.

Attainder (a-tān'dėr), the legal consequences of a sentence of death or outlawry pronounced against a person for treason or felony, the person being said to be *attainted*. It resulted in forfeiture of estate and 'corruption of blood,' rendering the party incapable of inheriting property or transmitting it to heirs; but these results now no longer follow. Attainder is wholly unknown in the laws of the United States; the Constitution prohibits it (Art. I, Sect. 9).

Attaint (a-tānt'), a writ at common law against a jury for a false verdict, never adopted in the United States.

Attalea (at-a-lē'a), a genus of American palms, comprising the piassava palm, which produces coquilla-nuts.

Attalus (at'a-lus), the names of three kings of ancient Pergamus, 241–133 B.C., the last of whom bequeathed his kingdom to the Romans. They were all patrons of art and literature.

Attar (at'ar), in the East Indies, a general term for a perfume from flowers; in Europe generally used only of the *attar* or *otto of roses*, an essential oil made from *Rosa centifolia*, the hundred-leaved or cabbage-rose, *R. damascēna* or damask-rose, *R. moschāta* or musk-rose, etc., 100,000 roses yielding only 180 grains of attar. Cashmere, Shiraz, and Damascus are celebrated for its manufacture, and there are extensive rose farms in the valley of Kezanlik in Roumelia and at Ghazipur in Benares. The oil is at first greenish, but afterwards it presents various tints of green, yellow, and red. It is concrete at all ordinary temperatures, but becomes liquid about 84° Fahr. It consists of two substances, a hydrocarbon and an oxygenated oil, and is frequently adulterated with the oils of rhodium, sandal-wood, and geranium, with the addition of camphor or spermaceti. It is used in making hair oil, in lavender water and other perfumes, its strength being such that a few drops suffice.

Attenuation (a-ten'ū-ā-shun), in brewing, the change which takes place in the saccharine wort during fermentation by the conversion of sugar into alcohol and carbonic acid, with diminution of specific gravity.

Atterbury (at'er-be-ri), FRANCIS, an English prelate, born in 1662, and educated at Westminster and Oxford. In 1687 he took his degree of M.A., and appeared as a controversialist in a defense of Luther, entitled *An Answer to Some Considerations on the Spirit of Martin Luther*, etc. He also assisted his pupil, the Hon. Mr. Boyle, in his famous controversy with Bentley on the *Epistles of Phalaris*. Having taken orders in 1687 he settled in London, became chaplain to William and Mary, preacher of Bridewell, and lecturer of St. Bride's. Controversy was congenial to him, and in 1706 he commenced one with Dr. Wake, which lasted four years, on the rights, privileges, and powers of convocations. For this service he received the thanks of the lower house of convocation and the degree of Doctor of Divinity from Oxford. Soon after the accession of Queen Anne he was made Dean of Carlisle, aided in the defense of the famous Sacheverell, and wrote *A Representation of the Present State of Religion*. In 1712 he was made Dean of Christ Church, and in 1714 he distinguished himself by his opposition to George I; and having entered into a correspondence with the Pretender's party was apprehended in August, 1722, and committed to the Tower. Being banished the kingdom, he settled in Paris, where he chiefly occupied himself in study and in correspondence with men of letters. But even here, in 1725, he was actively engaged in fomenting discontent in the Scottish Highlands. He died in 1732.

Atterbury, WILLIAM WALLACE (1866—), an American railway official, born at New Albany, Ind. Graduating from Yale in 1886, he began his railroad work in the Altoona (Pa.) shops as an apprentice, becoming road foreman in 1889. He was master mechanic of the Pennsylvania Co. at Fort Wayne, Ind., from 1893 to 1896; general superintendent of motive power on the lines east of Pittsburgh and Erie, 1896-1903; general manager, 1903-09; vice-president of the Pennsylvania Co. from 1909. In the firemen's dispute of 1913 he served as one of three members of a board of arbitration. On August 6, 1917, he was granted leave of absence to go to France following the entrance of the United States into the European war (q. v.), and was director of construction and operation of the United States mili-

tary railways in France till the close of the war. His work was acknowledged to be of great assistance in the success that attended the operations of the American Expeditionary Force. He was commissioned a brigadier-general of the Army of the United States.

Attic (at'ik), an architectural term variously used. An *Attic base* is a peculiar kind of base, used by the ancient architects in the Ionic order. Examples of its use exist in the work of Palladio, etc. An *Attic story* is a low story in the upper part of a house rising above the main portion of the building. In ordinary language an attic is an apartment lighted by a window in the roof.

Attica (at'i-ka), a State of ancient Greece, the capital of which, Athens, was once the leading city in the world. The territory was triangular in shape, with Cape Sunium (Colonna) as its apex and the ranges of Mounts Cithæron and Parnes as its base. On the north these ranges separated it from Bœotia; on the west it was bounded by Megaris and the Saronic Gulf; on the east by the Ægean. Its most marked physical divisions consisted of the highlands, midland district, and coast district, with the two famous plains of Eleusis and of Athens. The Cephissus and Ilissus. though small, were its chief streams; its principal hills, Cithæron, Parnes, Hymettus, Pentelicus, and Laurium. Its soil has probably undergone considerable deterioration, but was anciently fertile in fruits, and especially of the olive and fig. These are still cultivated as well as the vine and cereals, but Attica is better suited for pasture than tillage. According to tradition the earliest inhabitants of Attica lived in a savage manner until the time of Cecrops, who came B.C. 1550, with a colony from Egypt, taught them all the essentials of civilization, and founded Athens. One of Cecrops' descendants founded eleven other cities in the regions round, and there followed a period of mutual hostility. To Theseus is assigned the honor of uniting these cities in a confederacy, with Athens as the capital, thus forming the Attic State. After the death of Codrus, B.C. 1068, the monarchy was abolished, and the government vested in archons elected by the nobility, at first for life, in 752 B.C. for ten years, and in 683 B.C. for one year only. The severe constitution of Draco was succeeded in 594 by the milder code of Solon, the democratic elements of which, after the brief tyranny of the Pisistratids were emphasized and developed by Clisthenes. He divided the people into ten classes, and made the senate consist of 500 persons, establishing as the government an oligarchy modified by popular control. Then came the splendid era of the Persian war, which elevated Athens to the summit of fame. Miltiades at Marathon and Themistocles at Salamis conquered the Persians by land and by sea. The chief external danger being removed, the rights of the people were enlarged; the archons and other magistrates were chosen from all classes without distinction. The period from the Persian war to the time of Alexander (B.C. 500 to 336) was most remarkable for the development of the Athenian constitution. Attica appears to have contained a territory of nearly 850 square miles, with some 500,000 inhabitants, 360,000 of whom were slaves, while the inhabitants of the city numbered 180,000. Cimon and Pericles (B.C. 444) raised Athens to its point of greatest splendor, though under the latter began the Peloponnesian war, which ended with the conquest of Athens by the Lacedæmonians. The succeeding tyranny of the Thirty, under the protection of a Spartan garrison, was overthrown by Thrasybulus, with a temporary partial restoration of the power of Athens; but the battle of Cheronæa (B.C. 338) made Attica, in common with the rest of Greece, a dependency of Macedon. The attempts at revolt after the death of Alexander were crushed, and in 260 B.C. Attica was still under the sway of Antigonus Gonatas, the Macedonian king. A period of freedom under the shelter of the Achæan League then ensued, but their support of Mithridates led in B.C. 146 to the subjugation of the Grecian States by Rome. After the division of the Roman Empire Attica belonged to the empire of the East until in A.D. 396 it was conquered by Alaric the Goth and the country devastated. Attica, along with the ancient Bœotia, now forms a nome or province (Attica and Bœotia) of the Kingdom of Greece.

Atticus (at'i-kus), TITUS POMPONIUS, a Roman of great wealth and culture, born 109 B.C., and died 32 B.C. On the death of his father he removed to Athens to avoid participation in the civil war, to which the tribune Sulpicius had fallen a victim. There he so identified himself with Greek life and literature as to receive the surname Atticus. It was his principle never to mix in politics, and he lived undisturbed amid the strife of factions. Sulla and the Marian party, Cæsar and Pompey, Brutus and Antony, were alike friendly to him, and he was in favor with Augustus. Of his close friend-

ship with Cicero proof is given in the series of letters addressed to him by Cicero. He married at the age of 53 and had one daughter, Pomponia, named by Cicero Atticula and Attica. He reached the age of seventy-seven years without sickness, but being then attacked by an incurable disease, ended his life by voluntary starvation. He was a type of the refined Epicurean, and an author of some contemporary repute, though none of his works have reached us.—The name Atticus was given to Addison by Pope, in a well-known passage (Prologue to the Satires addressed to Dr. Arbuthnot).

Attila (at'i-la; in German, *Etzel*), the famous leader of the Huns, was the son of Mundzuk, and the successor in conjunction with his brother Bleda, of his uncle Rhuas. The rule of the two leaders extended over a great part of northern Asia and Europe, and they threatened the Eastern Empire, and twice compelled the weak Theodosius II to purchase an inglorious peace. Attila caused his brother Bleda to be murdered (444), and in a short time extended his dominion over all the peoples of Germany and exacted tribute from the eastern and western emperors. The Vandals, the Ostrogoths, the Gepidæ, and a part of the Franks united under his banners, and he speedily formed a pretext for leading them against the Empire of the East. He laid waste all the countries from the Black to the Adriatic Sea, and in three encounters defeated the Emperor Theodosius, but could not take Constantinople. Thrace, Macedonia, and Greece all submitted to the invader, who destroyed seventy flourishing cities; and Theodosius was obliged to purchase a peace. Turning to the west, the 'scourge of God,' as the universal terror termed him, crossed with an immense army the Rhine, the Moselle, and the Seine, came to the Loire, and laid siege to Orleans. The inhabitants of this city repelled the first attack, and the united forces of the Romans under Aetius, and of the Visigoths under their king Theodoric, compelled Attila to raise the siege. He retreated to Champagne, and waited for the enemy in the plains of Chalons. In apparent opposition to the prophecies of the soothsayers the ranks of the Romans and Goths were broken; but when the victory of Attila seemed assured the Gothic prince Thorismond, the son of Theodoric, poured down from the neighboring height upon the Huns, who were defeated with great slaughter. Rather irritated than discouraged, he sought in the following year a new opportunity to seize upon Italy, and demanded Honoria, the sister of Valentinian III, in marriage, with half the kingdom as a dowry. When this demand was refused he conquered and destroyed Aquileia, Padua, Vicenza, Verona, and Bergamo, laid waste the plains of Lombardy, and was marching on Rome when Pope Leo I went with the Roman ambassadors to his camp and succeeded in obtaining a peace. Attila went back to Hungary, and died on the night of his marriage with Hilda or Ildico (453), either from the bursting of a blood-vessel or by her hand. The description that Jordanes has left us of him is in keeping with his Kalmuck-Tartar origin. He had a large head, a flat nose, broad shoulders, and a short and ill-formed body; but his eyes were brilliant, his walk stately, and his voice strong and well-toned.

Attleboro (at'tl-bur-o), a town of Bristol Co., Mass., 31 miles s. by w. of Boston. More than one-tenth of the jewelry made in the United States is manufactured here. Other products are silverware, machinery, cotton goods, wrenches and other pressed steel products. The public buildings include a court house, library, two hospitals, sanitarium, etc. The city is governed by a mayor and council. Attleboro is on the main line of the New York, New Haven & Hartford R. R., in the heart of New England's industrial area. Pop. (1910) 16,215; (1920) 19,731.

Attorney (at-tér-ni), a person appointed to do something for and in the stead and name of another. An attorney may have *general* powers to act for another; or his power may be *special*, and limited to a particular act or acts. A special attorney is appointed by a deed called a *power of attorney*, specifying the acts which he is authorized to do. An *attorney at law* is a person qualified to appear for another before a court of law to prosecute or defend any action on behalf of his client. The rules and qualifications, whereby one is authorized to practice as an attorney in any court, are very different in different countries, and in the different courts of the same country. There are various statutes on this subject in the laws of the several States, and almost every court has certain rules, a compliance with which is necessary in order to authorize any one to appear in court for and represent any party to a suit without special authority under seal. Women are now admitted as practicing attorneys.

Attorney-general, in England and Ireland, the first law-officer and legal adviser of the crown, acting on its behalf in its revenue and

criminal proceedings, carrying on prosecutions in crimes that have a public character, guarding the interests of charitable endowments, and granting patents. The solicitor-general holds a similar position, and may act in his place. In the United States the attorney-general is a member of the President's cabinet and the head of the department of justice. The individual States have also attorneys-general, who have charge of all legal questions affecting the States.

Attraction (a-trak'shun), the tendency of all material bodies, masses or particles to approach each other, to unite, and to remain united. It was Newton that first determined the laws of this apparent force, though he doubted the existence of any actual attraction. When bodies tend to come together from sensible distances the tendency is termed either the attraction of *gravitation*, *magnetism*, or *electricity*, according to circumstances; when the attraction operates at insensible distances it is known as *adhesion* with respect to surfaces, as *cohesion* with respect to the particles of a body, and as *affinity* when the particles of different bodies tend together. It is by the attraction of gravitation that all bodies fall to the earth when unsupported. Various explanations of the mechanism of gravitation have been attempted, but none has been found satisfactory.

Attrek. See *Atrek*.

Attribute (at'ri-būt), in philosophy, a quality or property of a substance, as whiteness or hardness. A substance is known to us only as a congeries of attributes.

In the fine arts an attribute is a symbol regularly accompanying and marking out some personage. Thus the caduceus, purse, winged hat, and sandals are attributes of Mercury, the trampled dragon of St. George.

Atwood (at'wụd), GEORGE, an English mathematician, born 1746; died 1807; best known by his invention, called after him *Atwood's Machine*, for verifying the laws of falling bodies. It consists essentially of a freely moving pulley over which runs a fine cord with two equal weights suspended from the ends. A small additional weight is laid upon one of them, causing it to descend with uniform acceleration. Means are provided by which the added weight can be removed at any point of the descent, thus allowing the motion to continue from this point onward with uniform velocity.

Atys, ATTYS (at'is), in classical mythology, the shepherd lover of Cybĕle, who, having broken the vow of chastity which he made her, castrated himself. In Asia Minor Atys seems to have been a deity, with somewhat of the same character as Adonis.

Aubagne (ō-bàn-yé), a town in France, department of Bouches-du-Rhône with manufactures of cottons, pottery, cloth. Pop. (1906) 6039.

Aubaine, DROIT D' (drwä dō-bān). See *Droit d'Aubaine*.

Aube (ōb), a northeastern French department; area, 2351 sq. miles; pop. 243,670. The surface is undulating and watered by the Aube, etc. The N. and N. W. districts are bleak and infertile, the southern districts remarkably fertile. A large extent of ground is under forests and vineyards, and the soil is admirable for grain, pulse, and hemp. The chief manufactures are worsted and hosiery. Troyes is the capital.—The river Aube, which gives name to the department, rises in Haute-Marne, flows N. W., and after a course of 150 miles joins the Seine.

Aubenas (ōb-nä), a town of France, dep. Ardèche, with a trade in coal, silk, etc. Pop. (1906) 3976.

Auber (ō-bār), DANIEL FRANÇOIS ESPRIT, a French operatic composer; born in 1782, at Caen in Normandy; died at Paris, in 1871. He was originally intended for a mercantile career, but devoted himself to music, studying under Cherubini. His first great success was his opera *La Bergère Châtelaine*, produced in 1820. In 1822 he had associated himself with Scribe as librettist, and other operas now followed in quick succession. Chief among them were *Masaniello*, or *La Muette de Portici* (1828), *Fra Diavolo* (1830), *Lestocq* (1834), *L'Ambassadrice* (1836), *Le Domino Noir* (1837), *Les Diamants de la Couronne* (1841), *Marco Spada* (1853), *La Fiancée du Roi des Garbes* (1864). Despite his success in *Masaniello*, his peculiar field was comic opera, in which his charming melodies, bearing strongly the stamp of the French national character, his uniform grace and piquancy, won him a high place.

Aubervilliers (ō-bār-vēl-yā), a suburban locality of Paris, with a fort belonging to the defensive works of the city. Pop. (1906) 33,358.

Aubigné, MERLE D'. See *Merle d'Aubigné*.

Aubin (ō-baṇ), a town of Southern France, department of Aveyron, 20 miles N. E. of Villefranche; mining district; coal; sulphur, alum, and iron. Pop. 9973.

Aubrey (ą'brē), JOHN, an English antiquary, born in Wiltshire in 1625 or 1626, died about 1700. He left large collections of manuscripts, which have been used by subsequent writers. His *Miscellanies* (London, 1696) contain much curious information, but display superstition.

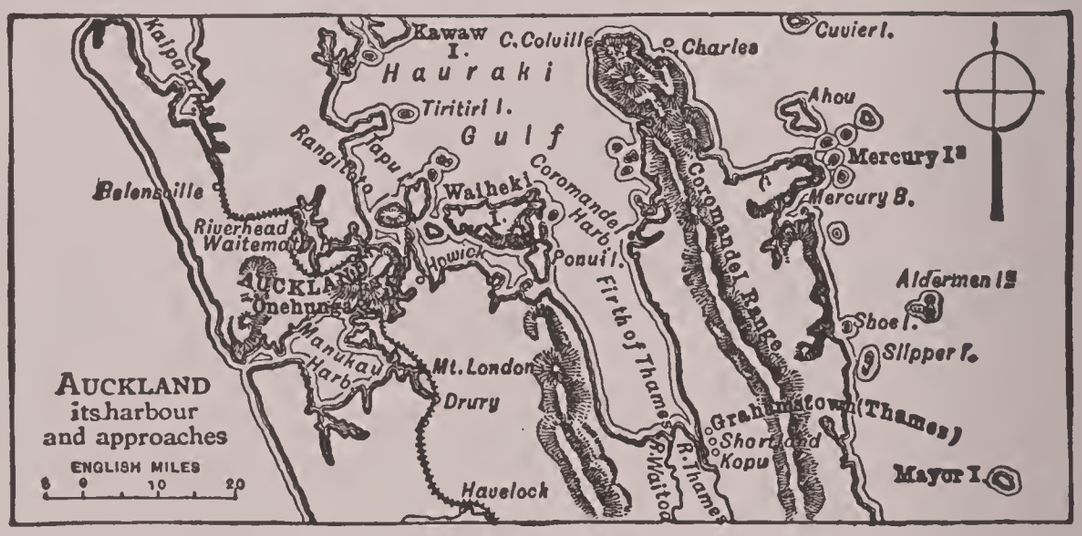
Auburn (ą'burn), the name of many places in the United States, the chief being a city of New York; the county seat of Cayuga Co., in the lake country, at the N. end of Owasco Lake. It is a residential and manufacturing city, with a network of railroad and trolley lines connecting it with sister cities and suburban towns, and with water power, Niagara electric power and gas are procurable at low rates. Products include farm machinery, tools, wagons, carpets, engines, pianos, woolen goods, shoes, etc. Seat of Auburn Theological Seminary (founded in 1818 by Presbyterians). Pop. (1920) 36,192. Another Auburn is in Maine, on the Androscoggin River, 34 miles N. of Portland. It has abundant water power and manufactures of canvas shoes, furniture, etc., also packing houses, and dairying interests. Pop. 16,985.

Aubusson (ō-bü-sōn), a town of the interior of France, dep. Creuse, celebrated for its carpets. Pop. 7211.

Aubusson (ō-bü-sōn), PIERRE D', grand-master of the Knights of St. John of Jerusalem, born in 1423 of a noble French family, served in early life against the Turks, then entered the order of St. John, obtained a commandery, was made grand-prior, and in 1476 succeeded the Grand-master Orsini. In 1480 the island of Rhodes, the headquarters of the order, was invaded by a Turkish army of 100,000 men. The town was besieged for two months and then assaulted, but the Turks were obliged to retire with great loss. He died at Rhodes in 1503.

Auchmuty (awch'mū-ti), RICHARD TYLDEN, philanthropist, of Scottish ancestry. In the American civil war he was appointed adjutant-general of volunteers. He earned a justly deserved reputation for his philanthropic movement in establishing trade-schools, among others the New York Trade School, for which he donated $160,000. He died July 18, 1893.

Auckland (awk'land), a town of New Zealand, in the North Island, founded in 1840, and situated on Waitemata Harbor, one of the finest harbors of New Zealand, where the island is only 6 miles wide, there being another harbor (Manukau) on the opposite side of the isthmus. At dead low water there is sufficient depth in the harbor for the largest steamers. The working ship channel has an average depth of 36 feet, and



varies in width from 1 to 2 miles. The site is picturesque, the streets spacious, and the public buildings numerous and handsome. It has a large and increasing trade, being connected with the chief places on the island by railroad, and ocean steamships to Australia, America, Great Britain and elsewhere. It was formerly the capital. Pop. 133,712.—The province of Auckland comprises the northern part of North Island, with an area of 25,364 square miles, and a population of 310,000. The surface is very diversified; volcanic phenomena are not uncommon, including geysers, hot lakes, etc.; rivers are numerous. Wool, timber, kauri-gum, etc., are exported. Gold has been obtained from quartz in the Thames Valley and elsewhere.

Auckland, WILLIAM EDEN, LORD, an English statesman, born 1744; educated at Eton and Oxford,

called to the bar 1768, under-secretary of state 1772; 1776 served on board of trade; 1778 he was nominated in conjunction with Lord Howe and others to act as a mediator between Britain and the American colonies. He was afterwards secretary of state for Ireland, ambassador extraordinary to France, to the Netherlands, etc. He died in 1814.

Auckland Islands, a group of islands about 180 miles S. of New Zealand, discovered in 1806; and belonging to Britain.

Auction (ạk'shun), a public sale to the party offering the highest price. A sale by auction must be conducted in the most open and public manner possible; and there must be no collusion on the part of the buyers. Puffing or mock bidding to raise the value by apparent competition is illegal.

Auction Bridge Whist, a game of cards for four persons, differing from whist chiefly: (1) in that no trump is turned, the declaration of trumps going to the player bidding the highest number of tricks for the privilege. The dealer has the first opportunity to bid or pass and the bidding continues until all four players have passed their first chance to bid or, after a bid, when three players in succession have passed. After a bid each successive player may pass, double an opponent's bid, redouble an opponent's double, if no intervening bid has been made, or make a higher bid, until the highest bidder is ascertained [to overbid a declaration, a player must bid either (*a*) an equal number of tricks of a more valuable declaration or (*b*) a greater number of tricks]; (2) only three persons actually engage in playing the hand, the cards of the successful bidder's partner being exposed as a dummy hand and played by the final declarer in conjunction with his own; (3) the scoring is unique. A game consists of 30 points, not counting honor scores, which vary in value with the trump declaration and the relative distribution of the honor cards between the two partners who hold a preponderance of honors. Each trick over six is scored as follows: Clubs, 6; diamonds, 7; hearts, 8; spades, 9; no trump, 10. If the declarer fulfills his contract, he scores all the trick points he actually makes. For every trick declarer falls short of his contract his adversaries score 50—if doubled, 100; if redoubled, 200. When declarer is doubled and wins, he scores, for fulfilling contract, 50, and each extra trick, 50, or if redoubled, for contract 100 and for each extra trick 100. All of this belongs to the honor score. When a hand is doubled every trick over the number contracted for scores double value; if redoubled, four times its value. A grand slam (taking all 13 tricks in a hand) counts 100; a small slam (taking 12 tricks in a hand) 50 on the honor score; 250 points are added for the winning of the rubber, which requires the winning of two games by one side.

Aucuba (ạ'cū-ba), a genus of plants, order Cornaceæ, one species of *A. Japonĭca*, an Asiatic shrub with evergreen spotted leaves and coral-red berries.

Aude (ōd), a maritime department in the S. of France; area, 2437 sq. miles; mainly covered by hills and traversed W. to E. by the Aude. The loftier districts are unproductive. The wines, especially the white, bear a good name; olives and other fruits are also cultivated. The manufactures are varied; the trade is facilitated by the Canal du Midi. Carcassonne is the capital; other towns are Narbonne and Castelnaudary. Pop. 308,327.—The river Aude rises in the Eastern Pyrenees, and flowing nearly parallel to the Canad du Midi falls into the Mediterranean after a course of 130 miles.

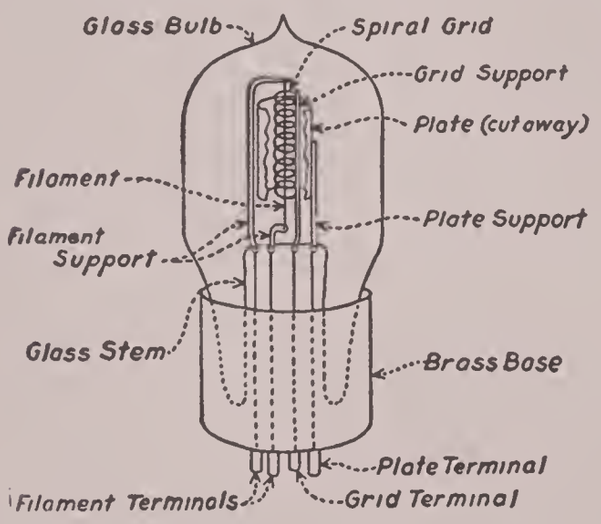
Audebert (ōd-bār), Jean Baptiste, French engraver and naturalist, born in 1759, died in 1800; published *Histoire Naturelle des Singes, des Makis, et des Galéopithèques; Histoire des Colibris*, etc.; and began *Histoire des Grimpereaux et des Oiseaux de Paradis*, finished by Desray—all finely illustrated works.

Audiometer (ạ'di-om'e-ter), an instrument for the measurement of hearing, invented by D. E. Hughes, who also invented the microphone (q. v.). Essential parts are a battery, primary and induction coils, a microphone key, and a telephone.

Audion Bulb, also called vacuum tube, vacuum bulb, thermionic valve, etc., the most important unit at the present time in the transmission of radio telephone messages. It somewhat resembles a small electric light bulb, but differs from the incandescent lamp in that there is enclosed in the glass bulb two elements in addition to the filament, and in that it has four external contact points instead of two. This glass bulb, highly exhausted of air or gas, is mounted in a brass and composition base through which the four terminal pins or contacts protrude. It contains (1) a metallic *filament* which may be heated to incandescence by passing an electric current through it, and to which two of the external points of contact are connected; (2) a metallic cage or spiral of wire, called the *grid*, surrounding the filament, and having an outside terminal; and (3)

a cylindrical metal *plate* surrounding the grid, also with an external contact point.

For many years it has been known that a metal filament heated in a vacuum will give off minute particles or negative charges of electricity, called *electrons*, in much the same fashion as a piece of iron raised to white heat in a blacksmith's forge throws off sparks. Dr. Fleming, an English inventor, was the first to adapt the emission of the electrons from a heated filament to apparatus for radio signals. Into a bulb containing a filament, he introduced a metallic plate with an external contact point, and then exhausted the air from the bulb. He found that this glow lamp, or oscillation valve, as he named it, would pass electricity better in one direction than in the oppo-



site direction. In other words, the valve had the property of rectifying alternating current, similar to that of the crystal used as a detector. By placing the valve in series with a source of radio-frequency oscillations, one-half of each oscillation could be suppressed, and the circuit would then be traversed by a pulsating direct current, just as in the case of the crystal detector, with the difference that the bulb gave much better results. The three-element vacuum valve which is in general use at the present time is a modification of the Fleming valve. The introduction of the third element, called the grid, is credited to Dr. Lee De Forest. At the present time the three-element vacuum tube is used in radio:

(1) As a detector, to rectify high-frequency oscillations.
(2) As an audio-frequency amplifier, to magnify variations in current in the telephone receiver circuit, thereby amplifying the sounds produced in the receivers.
(3) As a radio-frequency amplifier, to magnify the high-frequency currents generated in the aerial by the incoming signals, thereby building up weak signals so that they will actuate the detector.
(4) As an oscillator, to generate high-frequency oscillations for both receiving and transmitting.
(5) As a modulator, to control or mould the high-frequency oscillations generated by the sending tube.

Audiphone (ą'di-fōn), an acoustic instrument which improves the hearing of partly deaf persons. It consists essentially of a fan-shaped plate of hardened caoutchouc, which is bent to a greater or less degree by strings, and is very sensitive to sound-waves. When used the edge is pressed against the upper front teeth, with the convexity outward, and the sounds being collected are conveyed from the teeth to the auditory nerve without passing through the external ear.

Auditor (ą'dit-or), in general practice, an officer of the court appointed to state items of debit and credit between parties in suits when accounts are in question, and show balances. He may be appointed by courts of either law or equity (in the latter case called master or examiner), at common law in actions of account, and in many States, by special statute, in other actions. In its wider application an auditor is a person, usually an expert accountant, appointed to examine and verify accounts and claims. Originally the chief objects of an audit were the detection or prevention of fraud, and the detection or prevention of errors. The relative positions of the present day purposes of the professional auditor are: (1) to ascertain the actual financial condition and earnings of an enterprise for (a) its proprietors, (b) its executives, (c) bankers or investors who are considering the purchase of its securities, (d) bankers who are considering the discounting or purchasing of its promissory notes; and (2) to detect fraud or errors.

Auditory Nerves. See *Ear*.

Audran (ō-drän), GERARD, a celebrated French engraver, born 1640; studied at Rome, was appointed engraver to Louis XIV; died at Paris in 1703. He engraved Le Brun's *Battles of Alexander*, two of Raphael's cartoons, Poussin's *Coriolanus*, etc., and takes a first place among historical engravers. Other members of the family were successful in the same profession.

Audubon (ą′dū-bon), JOHN JAMES, an American naturalist of French extraction, born near New Orleans in 1780, was educated in France, and studied painting under David. In 1798 he settled in Pennsylvania, but having a great love for ornithology he set out in 1810 with his wife and child, descended the Ohio, and for many years roamed the forests in every direction, drawing the birds which he shot. In 1826 he went to England, exhibited his drawings in Liverpool, Manchester, and Edinburgh, and finally published them in a work of double-folio size, with hundreds of colored plates of birds the size of life (*The Birds of America*, 4 vols., 1827–39), with an accompanying text (*Ornithological Biography*, 5 vols. 8vo, partly written by Prof. Macgillivray). On his final return to America he labored with Dr. Bachman on a finely illustrated work entitled *The Quadrupeds of America* (1843–50, 3 vols.). He died at New York in 1851.

Auerbach (ou′ėr-bäh), a manufacturing town of Germany, kingdom of Saxony, 18 miles S. of Zwickau. Pop. 9574.

Auerbach, BERTHOLD, a distinguished German author of Jewish extraction, born 1812, died 1882. He abandoned the study of Jewish theology in favor of philosophy, publishing in 1836 his *Judaism and Modern Literature*, and a translation of the works of Spinoza with critical biography (5 vols., 1841). His later works were tales or novels, and his *Village Tales of the Black Forest* (*Schwarzwälden Dorfgeschichten*) as well as others of his writings have been translated into several languages. Other works: *Barfüssele; Joseph im Schnee; Edelweiss; Auf der Höhe; Das Landhaus am Rhein; Waldfried; Brigitta.*

Auerstadt (ou′ėr-stet), battle at, Oct. 14, 1806. See *Jena.*

Augeas (ą-jē′as), a fabulous king of Elis, in Greece, whose stable contained 3000 oxen, and had not been cleaned for thirty years. Hercules undertook to clear away the filth in one day in return for a tenth part of the cattle, and executed the task by turning the river Alphēus through it. Augeas, having broken the bargain, was deposed and slain by Hercules.

Auger (ą′gėr), an instrument for boring holes considerably larger than those bored by a gimlet; used by carpenters and joiners, shipwrights, etc.

Augereau (ōzh-rō), PIERRE FRANÇOIS CHARLES, Duke of Castiglione, Marshal of France, son of a mason, born at Paris in 1757. He adopted the life of a soldier, and by 1796 had reached the rank of general of division in the army of Italy. At Casale, Lodi, Castiglione, and Arcole, he highly distinguished himself. In 1797 he was at Paris, and was the instrument of the *coup d'état* of the 18th Fructidor (Sept. 4). In 1799 he was chosen a member of the Council of Five Hundred. He then obtained the command of the army in Holland, and fought till the end of the campaign. In 1803 he was appointed to lead the army collected at Bayonne against Portugal. In 1804 he was named marshal of the empire, and grand officer of the Legion of Honor. He subsequently took part in the battles of Jena and Eylau, held a command in Spain, and in July, 1813, led the army in Bavaria against Saxony, taking part in the battle of Leipzig. On Napoleon's abdication he submitted to Louis XVIII. who named him a peer. He died in 1816.

Augier (ō-zhi-ā), EMILE, a noted French dramatist, born 1822, came young to Paris, entered a lawyer's office, but relinquished law for literature; elected an academician in 1857; in 1868 a commander of the Legion of Honor. His first and one of his best dramas was the comedy *La Ciguë* (1844); among his other works are *L'Aventurière, Gabrielle, Paul Forestier, Le Mariage d'Olympe, Le Gendre de M. Poirier, Les Effrontés, Le Fils de Giboyer, Les Lions et lès Renards, Maître Guérin, Les Fourchambault*, etc. Died in 1889.

Augite (ą′jīt), or PYROXENE, a mineral of the hornblende family, an essential component of many igneous rocks, such as basalt, greenstone, and porphyry. When crystallized it assumes the form of short, slightly rhombic prisms with their lateral edges replaced, and terminated at one or both extremities by numerous planes. Its specific gravity is from 3.19 to 3.52; luster vitreous; hardness sufficient to scratch glass. It has many varieties, diopside, sahlite, malacolite, coccolite, etc., but is composed essentially of silica, lime, and magnesia. It may be imitated by the artificial fusion of its constituents. A transparent green variety found at Zillerthal, in the Tyrol, is used in jewelry.

Augsburg (ougz′bu*r*h; Lat. *Augusta Vindelicorum*), a city of Bavaria, at the junction of the Wertach and Lech, antique in appearance, but some fine streets, squares, and handsome or interesting buildings, including a splendid town-hall, a lofty belfry (Perlach Tower), cathedral, with paintings by Domenichino, Holbein, etc.; St.

Ulrich's Church; the bishop's palace, where the Augsburg Confession was presented to the diet, now a royal residence; the Fugger Palace, or mansion of the celebrated Fugger family, the public library, the theater, the Academy of Arts, and the Fugger range of almshouses. Augsburg was a renowned commercial center in the middle ages, and is still an important emporium of South German and Italian trade; industries: cotton spinning and weaving, dyeing, woolen manufacture, machinery and metal goods, books and printing, chemicals, etc. The Emperor Augustus established a colony here about 12 B.C. In 1276 it became a free city, and besides being a great mart for the commerce between the north and south of Europe, it was a great center of German art in the middle ages. It early took a conspicuous part in the Reformation. (See next article.) In 1806 it was incorporated in Bavaria. Pop. (1919) 154,555.

Augsburg Confession, a document which was presented by the Protestants at the Diet of Augsburg, 1530, to the Emperor Charles V and the diet, and being signed by the Protestant States was adopted as their creed. Luther made the original draft; but it was altered by Melanchthon, and there arose a division between those who held the original and those who held the altered Augsburg Confession.

Augurs (ą'gurs), a board or college of diviners who, among the Romans, predicted future events and announced the will of the gods from the occurrence of certain signs. These consisted of signs in the sky, especially thunder and lightning; signs from the flight and cries of birds; from the feeding of the sacred chickens; from the course taken or sounds uttered by various quadrupeds or by serpents; from accidents or occurrences, such as spilling the salt, sneezing, etc. The answers of the augurs as well as the signs by which they were governed were called *auguries*, but bird-predictions were properly termed *auspices*. Nothing of consequence could be undertaken without consulting the augurs, and by the mere utterance of the words *alio die* ('meet on another day') they could dissolve the assembly of the people and annul all decrees passed at the meeting.

August (ą'gust), the eighth month of the year. It was the sixth of the Roman year, and hence was called *Sextīlis*, till the Emperor Augustus affixed to it his own name, from the fact that Julius Cæsar had given his name to the preceding month. He also changed its length to 31 days from the same jealous motive, and thus disturbed the regular succession of the months in the Julian calendar.

Augusta, a city, county seat of Richmond Co., Georgia, on Savannah River, at head of navigation, 231 miles from its mouth. It is one of the greatest cotton markets in the world, and is a manufacturing city of the first importance. A canal furnishes power for cotton mills and numerous industries. Seat of Richmond Academy, Georgia Medical College and other institutions. Pop. (1910) 41,040; (1920) 52,548.

Augusta (ą-gus'ta), the capital of Maine, on the river Kennebec, 44 miles from its mouth, at the head of navigation. It is on the Maine Central railroad and is connected with Boston by steamship line. A large dam furnishes power for cotton, pulp and paper mills, shoe factories, lumber mills, etc. Educational and trade center. Pop. 14,114.

Augustana College AND THEOLOGICAL SEMINARY, at Rock Island, Ill., founded in Chicago in 1860. It is owned and supported by the Evangelical Lutheran Augustana Synod of North America. It is coeducational except in its theological department.

Augusta Victoria, Empress of Germany from 1888 to 1918, born Oct. 28, 1858, eldest daughter of the Duke of Schleswig-Holstein-Sonderburg-Augustenberg; married Prince William of Prussia, afterward William II of Germany; died at Doorn, Holland, April 11, 1921.

Augustine (ą'gus-tēn; AURELIUS AUGUSTINUS), ST., a renowned father of the Christian Church, was born at Tagaste, in Africa, in 354, his mother, Monica, being a Christian, his father, Patricius, a Pagan. His parents sent him to Carthage to complete his education, but he disappointed their expectations by his neglect of serious study and his devotion to pleasure. A lost book of Cicero's, called *Hortensius*, led him to the study of philosophy; but dissatisfied with this he went over to the Manichæans. He was one of their disciples for nine years, but left them, went to Rome, and thence to Milan, where he announced himself as a teacher of rhetoric. St. Ambrose, the bishop of this city, converted him to the faith of his boyhood, and the reading of Paul's epistles wrought an entire change in his life and character. He retired into solitude, and prepared himself for baptism, which he received in his thirty-third year from the hands of Ambrose. Returning to Africa, he sold his estate and gave

the proceeds to the poor, retaining only enough to support him. At the desire of the people of Hippo Augustine became the assistant of the bishop of that town, preached with extraordinary success, and in 395 succeeded to the see. He entered into a warm controversy with Pelagius concerning the doctrines of free will, grace, and predestination, and wrote treatises concerning them, but of his various works his *Confessions* is most secure of immortality. He died August 28, 430, while Hippo was besieged by the Vandals. He was a man of great enthusiasm, self-devotion, zeal for truth, and powerful intellect, and though there have been fathers of the church more learned, none have wielded a more powerful influence. His writings are partly autobiographical (as the *Confessions*), partly polemical, homiletic, or exegetical. The greatest is the *City of God* (*De Civitate Dei*), a vindication of Christianity.

Au'gustine, or AUSTIN, ST., the *Apostle of the English*, flourished at the close of the sixth century, was sent with forty monks by Pope Gregory I to introduce Christianity into Saxon England, and was kindly received by Ethelbert, King of Kent, whom he converted, baptizing 10,000 of his subjects in one day. In acknowledgment of his tact and success Augustine received the archiepiscopal pall from the pope, with instructions to establish twelve sees in his province, but he could not persuade the British bishops in Wales to unite with the new English Church. He died in 604, or some years later.

Augustins (ą'gus-tins), or AUGUSTINES, members of several monastic fraternities who follow rules framed by the great St. Augustine, or deduced from his writings, of which the chief are the Canons Regular of St. Augustine, or Austin Canons, and the Begging Hermits or Austin Friars. The Austin Canons were introduced into Britain about 1100, and had about 170 houses in England and about 25 in Scotland. They took the vows of chastity and poverty, and their habit was a long black cassock with a white rochet over it, having over that a black cloak and hood. The Austin Friars, originally hermits, were a much more austere body, went barefooted, and formed one of the four orders of mendicants. An order of nuns had also the name of Augustines. Their garments, at first black, were latterly violet.

Augustowo (ow-gös-to'vo), a town of Russian Poland, government Suwalki. Pop. 13,000.

Augustulus (ą-gus'tu-lus), ROMULUS, the last of the Western Roman Emperors; reigned for one year (475–76), when he was overthrown by Odoacer and banished.

Augustus (ą-gus'tus), CAIUS JULIUS CÆSAR OCTAVIANUS, originally called *Caius Octavius*, Roman Emperor, was the son of Caius Octavius and Atia, a daughter of Julia, the sister of Julius Cæsar. He was born 63 B.C., and died A.D. 14. Octavius was at Apollonia, in Epirus, when he received news of the death of his uncle (B.C. 44), who had previously adopted him as his son. He returned to Rome to claim Cæsar's property and avenge his death, and now took, according to usage, his uncle's name with the surname Octavianus. He was aiming secretly at the chief power, but at first

The Emperor Augustus.

he joined the republican party, and assisted at the defeat of Antony at Mutĭna. He got himself chosen consul in 43. Soon after the first triumvirate was formed between him and Antony and Lepidus, and this was followed by the conscription and assassination of three hundred senators and two thousand knights of the party opposed to the triumvirate. Next year Octavianus and Antony defeated the republican army under Brutus and Cassius at Philippi. The victors now divided the Roman world between them, Octavianus getting the West, Antony the East, and Lepidus Africa. Sextus Pompeius, who had made himself formidable at sea, had now to be put down; and Lepidus, who had hitherto retained an appearance of power, was deprived of all authority (B.C. 36) and retired into private life. Antony and Octavianus now

shared the empire between them; but while the former, in the East, gave himself up to a life of luxury, and alienated the Romans by his alliance with Cleopatra and his adoption of Oriental manners, Octavianus skillfully cultivated popularity, and soon declared war ostensibly against the Queen of Egypt. The naval victory of Actium, in which the fleet of Antony and Cleopatra was defeated, made Octavianus master of the world, B.C. 31. He returned to Rome B.C. 29, celebrated a splendid triumph, and caused the temple of Janus to be closed in token of peace being restored. Gradually all the highest offices of State, civil and religious, were united in his hands, and the new title of Augustus was also assumed by him, being formally conferred by the senate in B.C. 27. Great as was the power given to him, he exercised it with wise moderation, and kept up the show of a republican form of government. Under him successful wars were carried on in Africa and Asia (against the Parthians), in Gaul and Spain, in Pannonia, Dalmatia, etc.; but the defeat of Varus by the Germans under Arminius with the loss of three legions, A.D. 9, was a great blow to him in his old age. Many useful decrees proceeded from him, and various abuses were abolished. He gave a new form to the senate, employed himself in improving the morals of the people, enacted laws for the suppression of luxury, introduced discipline into the armies, and order into the games of the circus. He adorned Rome in such a manner that it was said, 'He found it of brick, and left it of marble.' The people erected altars to him, and, by a decree of the senate, the month Sextilis was called *Augustus* (our August). He gave it 31 days, in order that July, the month of Julius Cæsar, should not surpass it in length. Through this piece of vanity the preceding regular succession in length of the months was broken up. He was a patron of literature; Virgil and Horace were befriended by him, and their works and those of their contemporaries are the glory of the *Augustan Age*. His death, which took place at Nola, plunged the empire into the greatest grief. He was thrice married, but had no son, and was succeeded by his stepson Tiberius, whose mother Livia he had married after prevailing on her husband to divorce her.

Augustus II (or FREDERICK AUGUSTUS I), Elector of Saxony and King of Poland, second son of John George III, elector of Saxony, was born at Dresden in 1670, died at Warsaw in 1733. He succeeded his brother in the electorate in 1694, and the Polish throne having become vacant, in 1696, by the death of John Sobieski, Augustus presented himself as a candidate for it and was successful. He joined with Peter the Great in the war against Charles XII of Sweden, invaded Livonia, but was defeated by Charles near Riga, and at Clissow, between Warsaw and Cracow. In 1704 he was deposed, and two years later formally resigned the crown to Stanislaus I, now devoting himself to his Saxon dominions. In 1709, after the defeat of Charles at Pultowa, the Poles recalled Augustus, who united himself anew with Peter. The two monarchs, in alliance with Denmark, sent troops into Pomerania, but the Swedish general Stenbock defeated the allies at Gadebusch, Dec. 20, 1712. The death of Charles XII put an end to the war, and Augustus concluded a peace with Sweden. A confederation was now formed in Poland against the Saxon troops, but through the mediation of Peter an arrangement was concluded by which the Saxon troops were removed from the kingdom. Augustus now gave himself wholly up to voluptuousness and a life of pleasure. His court was one of the most splendid and polished in Europe. The Poles yielded but too readily to the example of their king, and the last years of his reign were characterized by boundless luxury and corruption of manners. His wife left him one son. The Countess of Königsmark bore him the celebrated commander Marshal Saxe (Maurice of Saxony).

Augustus III (or FREDERICK AUGUSTUS II), Elector of Saxony and King of Poland, son of Augustus II, born at Dresden in 1696, succeeded his father as elector in 1733, and was chosen King of Poland through the influence of Austria and Russia. He closely followed the example of his father, distinguishing himself by the splendor of his feasts and the extravagance of his court. He preferred Dresden to Warsaw, and through his long absence from Poland the government sank into entire inactivity. During the first Silesian war he formed a secret alliance with Austria. The consequence was that during the second Silesian war Frederick the Great of Prussia pushed on into Saxony, and occupied the capital, from which Augustus fled. By the peace of Dresden, Dec. 25, 1745, he was reinstated in the possession of Saxony. In 1756 he was involved anew in war against Prussia. When Frederick declined his proposal of neutrality he left Dresden, and entered the camp at Pirna, where 17,000 Saxon

troops were assembled. Frederick surrounded the Saxons, who were obliged to surrender, and Augustus fled to Poland. On the threat of invasion by Russia he returned to Dresden, where he died in 1763. His son, Frederick Christian, succeeded him as Elector of Saxony, and Stanislaus Poniatowski as King of Poland.

Auk (awk), a name of certain swimming birds, family Alcidæ, including the great auk, the little auk, the puffin, etc. The genus *Alca*, or auks proper, contains only two species, the great auk (*Alca impennis*), and the razor-bill (*Alca torda*). The great auk or gair-fowl, a bird about 3 feet in length, used to be plentiful in northerly regions, and also visited the British shores, but has become extinct. Some seventy skins, about as many eggs, with bones representing perhaps a hundred individuals, are preserved in various museums. Though the largest species of the family, the wings were only 6 inches from the carpal joint to the tip, totally useless for flight, but employed as fins in swimming, especially under water. The tail was about 3 inches long; the beak was high, short, and compressed; the head, neck, and upper parts were blackish; a large spot under each eye, and most of the under parts white. Its legs were placed so far back as to cause it to sit nearly upright. The razorbill is about 15 inches in length, and its wings are sufficiently developed to be used for flight. Thousands of these birds are killed on the coast of Labrador for their breast feathers, which are warm and elastic.

Aulapolay (ą-lap'o-lā), or ALLEPPI, a seaport on the southwest coast of Hindustan, Travancore, between the sea and a lagoon, with a safe roadstead all the year round; exports timber, coir, cocoanuts, etc. Pop. 24,918.

Aulic (ą'lik; Lat. *aula*, a court or hall), an epithet given to a council (the *Reichshofrath*) in the old German Empire, one of the two supreme courts of the German Empire, the other being the court of the imperial chamber (*Reichskammergericht*). It had not only concurrent jurisdiction with the latter court, but in many cases exclusive jurisdiction, in all feudal processes, and in criminal affairs, over the immediate feudatories of the emperor and in affairs which concerned the imperial government. The title is now applied in Germany in a general sense to the chief council of any department, political, administrative, judicial, or military.

Aulis (ą'lis), in ancient Greece, a seaport in Bœotia, on the strait called Euripus, between Bœotia and Eubœa. See *Iphigenia*.

Aullagas (ou-lyä'gäs), a salt lake of Bolivia, which receives the surplus waters of Lake Titicaca through the Rio Desagualero, and has only one perceptible insignificant outlet, so that what becomes of its superfluous water is still a matter of uncertainty.

Aumale (ō-mäl), a small French town, department of Seine Inférieure, 35 miles N. E. of Rouen, which has given titles to several notables in French history.—JEAN D'ARCOURT, EIGHTH COUNT D'AUMALE, fought at Agincourt, and defeated the English at Gravelle (1423).—CLAUDE II, DUC D'AUMALE, one of the chief instigators of the Massacre of St. Bartholomew, was killed 1573.—CHARLES DE LORRAINE, DUC D'AUMALE, was an ardent partisan of the League in the politico-religious French wars of the sixteenth century.—HENRI-EUGENE-PHILIPPE LOUIS D'ORLEANS, DUC D'AUMALE, son of Louis Philippe, king of the French, was born in 1822. In 1847 he succeeded Marshal Bugeaud as governor-general of Algeria, where he had distinguished himself in the war against Abd-el-Kader. After the revolution of 1848 he retired to England; but he returned to France in 1871, and was elected a member of the assembly; became inspector-general of the army in 1879, and was expelled along with the other royal princes in 1886. He is author of a *History of the House of Condé*, several pamphlets, etc. Died 1897.

Aungerville (ąn'ger-vil), RICHARD, known as Richard de Bury (from his birthplace Bury St. Edmund's), English statesman, bibliographer, and correspondent of Petrarch, born 1281, died 1345. He entered the order of Benedictine monks, and became tutor to the Prince of Wales, afterwards Edward III. Promoted to several offices of dignity, he ultimately became Bishop of Durham, and Lord-chancellor of England. During his frequent embassies to the continent he made the acquaintance of many of the eminent men of the day. He was a diligent collector of books, and formed a library at Oxford. Author of *Philobiblon*, 1473; *Epistolæ Familiarium*, including letters to Petrarch, etc.

Aunoy (ō-nwä), COUNTESS D', French writer, born 1650, died 1705, was the author of *Contes des Fées* (Fairy Tales), many of which, such as *The White Cat*, *The Yellow Dwarf*, etc., have been translated into English. She also wrote a number of novels, historical memoirs, etc.

Aurangabad (ą-rang-gä-bäd'), or Aurengabad, a town of

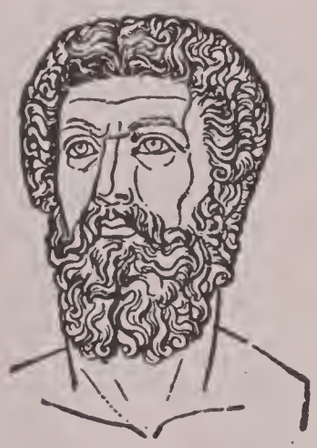
India, in the territory of the Nizam of Haidarabad, 175 miles from Bombay. It contains a ruined palace of Aurengzebe and a mausoleum erected to the memory of his favorite wife. It was formerly a considerable trading center, but its commercial importance decreased when Haidarabad became the capital of the Nizam. Pop. 26,165.

Aurantiaceae (ą-ran-ti-ā′se-ē), the orange tribe, a natural order of plants, polypetalous dicotyledons, with leaves containing a fragrant essential oil in transparent dots, and a superior pulpy fruit, originally natives of India; examples comprise the orange, lemon, lime, citron, and shaddock.

Auray (ō-rä), a seaport of northwest France, dep. Morbihan, with a deaf and dumb institute, and within 2 miles of St. Anne of Auray, a famous place of pilgrimage. Pop. (1906) 5241.

Aurelian (ą-rē′li-an), Lucius Domitius Aurelianus, Emperor of Rome, of humble origin, was born about 212 A.D., rose to the highest rank in the army, and on the death of Claudius II (270) was chosen emperor. He delivered Italy from the barbarians (Alemanni and Marcomanni), and conquered the famous Zenobia, Queen of Palmyra. He followed up his victories by the reformation of abuses, and the restoration throughout the empire of order and regularity. He lost his life, A.D. 275, by assassination, when heading an expedition against the Persians.

Aurelius Antoninus (ą-rē′li-us an-to-nī′nus), Marcus, often called simply Marcus Aurelius, Roman emperor and philosopher, son-in-law, adopted son, and successor of Antoninus Pius, born A.D. 121, succeeded to the throne 161, died 180. His name originally was Marcus Annius Verus. He voluntarily shared the government with Lucius Verus, whom Antoninus Pius had also adopted. Brought up and instructed by Plutarch's nephew, Sextus, the orator Herodes Atticus, and L. Volusius Mecianus, the jurist, he had become acquainted with learned men, and formed a particular love for the Stoic philosophy. A war with Parthia broke out in the year of his accession, and did not terminate till 166. A confederacy of the northern tribes now threatened Italy, while a frightful pestilence, brought from the East with the army, raged in Rome itself. Both emperors set out in person against the rebellious tribes. In 169 Verus died, and the sole command of the war devolved on Marcus Aurelius, who prosecuted it with the utmost rigor, and nearly exterminated the Marcomanni. His victory over the Quadi (174) is connected with a famous legend. Dion Cassius tells us that the twelfth legion of the Roman army was shut up in a defile, and reduced to great straits for want of water, when a body of Christians enrolled in the legion prayed for relief. Not only was rain sent, which enabled the Romans to quench their thirst, but a fierce storm of hail beat upon the enemy, accompanied by thunder and lightning, which so terrified them that a complete victory was obtained, and the legion was ever after called 'The Thundering Legion.' After this victory the Marcomanni, the Quadi, as well as the rest of the barbarians, sued for peace. The sedition of the Syrian governor Avidius Cassius, with whom Faustina, the empress, was in treasonable communication, called off the emperor from his conquests, but before he reached Asia the rebel was assassinated. Aurelius returned to Rome, after visiting Egypt and Greece, but soon new incursions of the Marcomanni compelled him once more to take the field. He defeated the enemy several times, but was taken sick at Sirmium, and died at Vindobona (Vienna) in 180. His only extant work is the *Meditations*, written in Greek, and which has been translated into most modern languages. This may be regarded as a manual of practical morality, in which wisdom, gentleness, and benevolence are combined in the most fascinating manner. Many believe it to have been intended for the instruction of his son Commodus. Aurelius was one of the best emperors ever Rome saw, although his philosophy and the magnanimity of his character did not restrain him from the persecution of the Christians, whose religious doctrines he was led to believe were subversive of good government.



Marcus Aurelius

Aurelius Victor, Sextus, a Roman historian, who lived between 350 and 400. He wrote *De Cæsaribus Historia*, an extant work, and is the reputed author of *Lives of Illustrious Romans*, and *On the Life and Character of the Emperors*, both extant.

Aurengzebe (ą′reng-zēb; 'ornament of the throne'), one of the greatest of the Mogul emperors of Hindustan, born in 1618 or 1619. When

he was nine years old his weak and unfortunate father, Shah Jehan, succeeded to the throne. Aurengzebe was distinguished, when a youth, for his serious look, his frequent prayers, his love of solitude, his profound hypocrisy, and his deep plans. In his twentieth year he raised a body of troops by his address and good fortune, and obtained the government of the Deccan. He stirred up dissensions between his brothers, made use of the assistance of one against the other, and finally shut his father up in his harem, where he kept him prisoner. He then murdered his relatives one after the other, and in 1659 ascended the throne. Notwithstanding the means by which he had got possession of power, he governed with much wisdom. Two of his sons, who endeavored to form a party in their own favor, he caused to be arrested and put to death by slow poison. He carried on many wars, conquered Golconda and Bijapur, and was engaged in ceaseless conflicts with the Mahratta power. After his death the Mogul Empire declined.

Aureola, Aureole (ạ-rē′ō-la, ạ′rē-ōl), in paintings, an illumination surrounding a holy person, as Christ, a saint, or a martyr, intended to represent a luminous cloud or haze emanating from him. It is generally of an oval shape, or may be nearly or quite circular, and is of similar character with the nimbus surrounding the heads of sacred personages.

Aureus (ạ′re-us). 1. Roman gold coin, first struck under Sulla, 1st century B.C. Its value varied at different times, from about $3 to $6. 2. *Staphylococcus pyogenes aureus*, a virulent pus-producing micro-organism, generating a golden color.

Aurich (ou′rēh), a German town, province of Hanover. Pop. 6013.

Auricle (ạ′ri-kl). See *Heart.*

Auricula (ạ-rik′u-la), a garden flower derived from the yellow *Primŭla Auricŭla*, found native in the Swiss Alps, and sometimes called bear's-ear from the shape of its leaves. It has for centuries been an object of cultivation by florists, who have succeeded in raising from seed a great number of beautiful varieties. Its leaves are obovate, entire or serrated, and fleshy, varying, however, in form in the numerous varieties. The flowers are borne on an erect umbel and central scape with involucre. The original colors of the corolla are yellow, purple, and variegated, and there is a mealy covering on the surface.

Auricular Confession. See *Confession.*

Aurifaber (ow′ri-fā-bir), the Latinized name of Johann Goldschmidt, one of Luther's companions, born in 1519, became pastor at Erfurt in 1566; died there in 1579. He collected the unpublished MSS. of Luther, and edited the *Letters* and the *Table-talk.*

Auriflamme (ạ′ri-flam). See *Oriflamme.*

Auriga (ạ-rē′ga), in astronomy, the *Wagoner*, a constellation of the northern hemisphere, containing the magnificent yellow star Capella, one of the brightest in the northern heavens.

Aurillac (ō-rē-yȧk), a town of France, capital of the dep. Cantal, in a valley watered by the Jordanne, about 270 miles S. of Paris; contains several ancient buildings of note; copper works, paper works, manufactures of lace, tapestry, leather, etc. Pop. (1906) 14,097.

Aurochs (ạ′roks), a species of wild bull or buffalo, the *urus* of Cæsar, *bison* of Pliny, the European bison, *Bos* or *Bonasus Bison* of modern naturalists.

Aurora (ạ-rō′ra), a city of Kane Co., Illinois, 39 miles W. of Chicago, in the heart of the Fox River Valley, noted for its dairy products. It is on the main line of the Chicago, Burlington & Quincy and other railroads. Its manufacturing interests include car shops, mining and conveying machinery, road scrapers, corsets, steel office furniture, foundries, machine shops, cotton mills, etc. Pop. (1910) 29,807; (1920) 36,397.

Aurora (ạ-ro′ra), a city of Lawrence County, Missouri, 31 miles S. W. of Springfield; in midst of rich farming and fruit country, and has lead and zinc mines. Pop. 5204.

Aurora (Gr. *Ēōs*) in classical mythology, the goddess of the dawn, daughter of Hyperion and Theia, and sister of Helios and Selēnē (Sun and Moon). She was represented as a charming figure, 'rosy-fingered,' clad in a yellow robe, rising at dawn from the ocean and driving her chariot through the heavens. Poets mention her love of Orion, Tithōnus, and Cephălus.

Auro′ra, one of the New Hebrides islands, S. Pacific Ocean, about 30 miles long by 5 wide. It rises to a considerable elevation, and is covered with a luxuriant vegetation.

Auro′ra Borea′lis, a luminous meteoric phenomenon appearing in the north, most frequently in high latitudes, the corresponding phenomenon in the southern hemisphere being called *Aurora Australis*, and both being also called *Polar Light*, *Streamers*, etc. The northern aurora has been by far the most observed and studied. It usually

manifests itself by streams of light ascending towards the zenith from a dusky line of cloud or haze a few degrees above the horizon, and stretching from the north towards the west and east, so as to form an arc with its ends on the horizon, and its different parts and rays are constantly in motion. Sometimes it appears in detached places; at other times it covers almost the whole sky. It assumes many shapes and a variety of colors, from a pale red or yellow to a deep red or blood color; and in the northern latitudes serves to illuminate the earth and cheer the gloom of the long winter nights. The appearance of the aurora borealis so exactly resembles the effects of artificial electricity that there is every reason to believe that their causes are identical. When electricity passes through rarefied air it exhibits a diffused luminous stream which has all the characteristic appearances of the aurora, and hence it is highly probable that this natural phenomenon is occasioned by the passage of electricity through the upper regions of the atmosphere. The influence of the aurora upon the magnetic needle is now considered as an ascertained fact, and the connection between it and magnetism is further evident from the fact that the beams or coruscations issuing from a point in the horizon west of north are frequently observed to run in the magnetic meridian. What are known as magnetic storms are invariably connected with exhibitions of the aurora, and with spontaneous galvanic currents in the ordinary telegraph wires; and this connection is found to be so certain that, upon remarking the display of one of the three classes of phenomena, we can at once assert that the other two are also observable. The aurora borealis is said to be frequently accompanied by sound, which is variously described as resembling the rustling of pieces of silk against each other, or the sound of wind against the flame of a candle. The aurora of the southern hemisphere is quite a similar phenomenon to that of the north.

Aurungabad. See *Aurangabad.*

Aurungzebe. See *Aurengzebe.*

Auscultation (as-kul-ta'shun), a method of distinguishing the state of the internal parts of the body, particularly of the thorax and abdomen, by observing the sounds arising in the part either through the immediate application of the ear to its surface (immediate auscultation) or by applying the stethoscope to the part and listening through it (mediate auscultation). Auscultation may be used with more or less advantage in all cases where morbid sounds are produced, but its general applications are: the *auscultation* of respiration, the *auscultation* of the voice; *auscultation* of coughs; *auscultation* of sounds foreign to all these, but sometimes accompanying them; *auscultation* of the actions of the heart; obstetric *auscultation.* The parts when struck also give different sounds in health and disease.

Ausonia (ą-sō'ni-a), an ancient poetical name of Italy.

Ausonius (ą-sō'ni-us), DECIUS MAGNUS, Roman poet, born at Burdigala (Bordeaux) about 310 A. D., died about 392. Valentinian intrusted to him the education of his son Gratian, and appointed him afterwards quæstor and pretorian prefect. Gratian appointed him consul in Gaul, and after this emperor's death he lived upon an estate at Bordeaux, devoted to literary pursuits. He wrote epigrams, idyls, ecologues, letters in verse, etc., still extant, and was probably a Christian. His poems have no great merit.

Auspices (as'pi-ses), among the ancient Romans strictly omens or auguries derived from birds, though the term was also used in a wider sense. Nothing of importance was done without taking the auspices, which, however, simply showed whether the enterprise was likely to result successfully or not, without supplying any further information. Magistrates possessed the right of taking the auspices, in which they were usually assisted by an augur. Before a war or campaign a Roman general always took the auspices, and hence the operations were said to be carried out 'under his auspices.' See *Augur.*

Aussig (ow'sig), a town in Bohemia, near the junction of the Biela with the Elbe, 42 miles N. N. W. of Prague; has mines and ships much coal; also has large manufactures of woolens, chemicals, etc. Pop. 37,265.

Austen (as'ten), JANE, English novelist, born 1775, at Steventon, in Hants, of which parish her father was rector. Her principal novels are, *Sense and Sensibility; Pride and Prejudice; Mansfield Park;* and *Emma.* Two more were published after her death entitled *Northanger Abbey* and *Persuasion,* the former written in 1798, the latter in 1813. Her novels are marked by ease, nature, and a complete knowledge of the domestic life of the English middle classes of her time, and still retain their popularity. She died in 1817.

Austerlitz (as'ter-litz), a town of Moravia, 10 miles E. of Brünn.

famous for the battle of the 2d of December, 1805, fought between the French (70,000 in number) and the allied Austrian and Russian armies (95,000). The decisive victory of the French led to the Peace of Pressburg, between France and Austria. It has been called the Battle of the Three Emperors—French, Austrian and Russian. It was the first great pitched battle in which Napoleon was the leader and its occurrence on the anniversary of his coronation gave the event special significance. Napoleon planned the battle with consummate skill. Leading the enemy to attack his right flank, he made a pretense of a stubborn defense, but actually massed his troops on his center and left, and at the zero hour, 9 o'clock on the morning of December 2d, he ordered Marshal Soult to begin the counter attack. The hill of Pratzen, which had been defended by Kutusoff and his Russian troops, was stormed by the French. The Cossacks fled in confusion. With the Russo-Austrian line pierced, the panic spread to the Austrian divisions which had been attacking the French right. They, too, after putting up a stubborn fight, finally joined in the flight. When night came Napoleon was master of the territory. The great victory, in the face of numerical superiority, was achieved at a cost to the French of something over 7000 men in killed and wounded, while the Russian and Austrian losses totaled some 30,000. The battle began in the mists of the dawn, but as it proceeded the sun shone out. Napoleon called attention to it, and since then the phrase 'the sun of Austerlitz' has been taken to mean any unexpected sign of good fortune.

Austin (ȧs'tin), the capital of Texas, county seat of Travis Co., on the Colorado River, about 200 miles from the Gulf of Mexico. It is served by 3 trunk railroads and has a great number of industries, including cotton gins and compresses, canneries, brick yards, gasoline engine factory, foundries, etc. It is a beautiful city and contains many notable buildings, including the University of Texas (q. v.), the State school for the blind, the Deaf and Dumb Institute, a military institute, Southwestern Theological Seminary (Presbyterian), and a number of other institutions. The great dam on the Colorado, carried away by flood in 1900, has been rebuilt and will supply 6000 horse-power per day.

The town was first called Waterloo, but in 1839, when it was selected as the capital of the Republic of Texas, the name was changed to Austin, in honor of Stephen Fuller Austin (q. v.). On account of the danger of falling into the hands of the Mexicans, the capital was removed to Houston. Austin became the capital again when President Anson Jones retired in favor of the new Governor of the State of Texas, which had been admitted to the Union. There was a long struggle between Austin and Houston as to which should be the capital. In 1850 a vote of the people was taken, and again in 1872, Austin being selected as the permanent capital. Pop. (1910) 29,860; (1920) 34,876.

Austin, a city, county seat of Mower Co., Minnesota, 101 miles s. of St. Paul. The railroad shops of the Chicago, Milwaukee & St. Paul R. R. are here. Other industries include brick and tile works, meat-packing plant, cement works, flouring mills, bottling works, etc. Pop. (1910) 6960; (1920) 10,118.

Austin, Alfred (1835-1913), an English poet; poet laureate from 1896. He was born at Headingley, Leeds; graduated from London University in 1853. Taking up the study of law, he was admitted to the bar in 1857, and attended the York assizes and West Riding sessions. From 1860 he devoted himself chiefly to travel and literature, writing many poems and prose works. He was a war correspondent for a time, representing the London *Standard* during the Franco-German war. His first publication of *Randolph: a Tale of Polish Grief* (1854). *The Season, a Satire*, was published in 1861. Other publications include *The Golden Age, Interludes, The Human Tragedy, Lyrical and Narrative Poems, Flodden Field, Sacred and Profane Love*, etc. His prose writings include *The Garden That I Love, Haunts of Ancient Peace, The Bridling of Pegasus*, and an autobiography, written in 1911.

Austin, Jane, an American author, born at Worcester, Massachusetts, in 1831. Educated in private schools in Boston, she early began her writing, contributing to various magazines. Her best known novels are the 'Pilgrim books': *Standish of Standish, Betty Alden, A Nameless Nobleman, David Alden's Daughter and Other Stories. Nantucket Scraps* and *Mrs. Beauchamps Brown* also achieved wide popularity. She died in 1893.

Austin, John, an English writer on jurisprudence, born 1790, died 1859. From 1826 to 1832 he filled the chair of jurisprudence at London University. He served on several royal commissions, one of which took him to Malta; lived for some years on the continent, and finally settled at Weybridge in Surrey. His fame rests solely on his great works, *The Province of Jurisprudence Determined*, published in 1832; and his *Lec-*

turcs on Jurisprudence, published by his widow between 1861 and 1863.

Austin, JONATHAN LORING (1748-1826), an American soldier and diplomat, born in Boston, Mass. He fought in the Revolutionary war and was for a time aide to Gen. Sullivan. Served as Secretary of Board of War of Massachusetts, and carried to Franklin in France the news of Burgoyne's surrender at Saratoga. He was Massachusetts agent in Spain and Holland, to secure loans, but was captured by the British. On his return he held various public positions.

Austin, STEPHEN (FULLER), an American pioneer, colonizer and statesman (1793-1836), founder of the State of Texas, born in Wythe Co., Virginia, son of Moses Austin of Connecticut, who had been granted permission by the Mexican government to plant a colony in Texas. On his father's death in 1821, Stephen Austin took up the plan of colonization and located on the site of the present city of Austin (q. v.). The colony prospered, but with the great influx of Americans a movement arose looking toward the independence of the territory, which had been included in the Mexican state of Coahuila. Austin was imprisoned in Mexico City for several months. On his release, he found that whereas the people had at first only asked for a State government within Mexico, they now demanded completed separation from Mexican control. In the war that followed he served for a short time as commander of the revolutionary army. He was a candidate for the first presidency, but was defeated by Gen. Sam Houston (q. v.).

Austin, WILLIAM, an American lawyer and author, born in Charlestown, Massachusetts (1778-1841); author of *Peter Rugg, the Missing Man*.

Australasia (as-tral-ā'sha), a division of the globe usually regarded as comprehending the islands of Australia, Tasmania, New Zealand, New Caledonia, the New Hebrides, the Solomon Islands, New Ireland, New Britain, the Admiralty Islands, New Guinea, and the Arru Islands, besides numerous other islands and island groups. It forms one of three portions into which some geographers have divided Oceania, the other two being Malasia and Polynesia. The term 'Australasia' is sometimes used to include only Australia, Tasmania and New Zealand.

Australia (as-trā'li-a; older name, NEW HOLLAND), the largest island in the world, of such extent that it is classed as a continent, lying between the Indian and Pacific Oceans, S. E. of Asia; between lat. 10° 39′ and 39° 11′ S.; long. 113° 5′ and 153° 16′ E.; greatest length, from W. to E., 2400 miles; greatest breadth, from N. to S., 1700 to 1900 miles. It is separated from New Guinea on the north by Torres Strait, from Tasmania on the south by Bass Strait. It is divided into two unequal parts by the Tropic of Capricorn, and consequently belongs partly to the South Temperate, partly to the Torrid Zone. The Commonwealth of Australia is a part of the British Empire and is composed of six original states and two territories: New South Wales, Victoria, Queensland, South Australia, Western Australia, Tasmania, Northern Territory, and Federal Capital Territory. The area and population of the commonwealth are as follows:

	Area in sq. m.	Pop.
New South Wales	310,700	1,855,561
Victoria	87,884	1,421,935
Queensland	668,497	698,864
South Australia	380,070	439,660
Western Australia	975,920	323,952
Tasmania	26,215	196,758
Northern Territory	523,620	4,563
Federal Capital Territory	912	1,829
Commonwealth	2,973,818	4,943,172

Canberra, in the Federal Capital Territory, is the capital of the commonwealth. The largest cities are: Sydney, Melbourne, Adelaide, Brisbane and Perth.

Although there are numerous spacious harbors on the coasts, there are few remarkable indentations; the principal being the Gulf of Carpentaria, on the N., the Great Australian Bight, and Spencer Gulf, on the S. The chief projections are Cape York Peninsula and Arnhem Land in the north. Parallel to the N. E. coast runs the Great Barrier Reef for 1000 miles. In great part the E. coast is bold and rocky, and is fringed with many small islands. Part of the S. coast is low and sandy, and part presents cliffs several hundred feet high. The N. and W. coasts are generally low, with some elevations at intervals.

The interior, so far as explored, is largely composed of rocky tracts and barren plains with little or no water. The whole continent forms an immense plateau, highest in the east, low in the center, and with a narrow tract of land usually intervening between the elevated area and the sea. The base of the tableland is granite, which forms the surface-rock in a great part of the southwest, and is common in the higher grounds along the east side. Secondary (cretaceous) and tertiary rocks are largely developed in the interior. Silurian rocks occupy a large area in South Australia, on both sides of Spencer Gulf. The mountainous region in the southeast and east is mainly composed of volcanic, Silurian, carbonaceous, and carboniferous

POLITICAL MAP
OF
AUSTRALASIA
SCALE OF MILES
0 100 200 300 400 500 600 700 800 900 1000
Hammond's Political Map of Australasia
Copyright by C.S.Hammond & Co.,N.Y.
EAST INDIAN ARCH.
TIMOR SEA
ARAFURA SEA
INDIAN OCEAN
PACIFIC OCEAN
CORAD SEA
GULF OF CARPENTARIA
NORTHERN TERRITORY
WESTERN AUSTRALIA
SOUTH AUSTRALIA
QUEENSLAND
NEW SOUTH WALES
VICTORIA
TASMANIA
NEW ZEALAND
NEW HEBRIDES
Solomon Is.
GREAT AUSTRALIAN BIGHT
TASMAN SEA
Bass Strait
Torres Strait
Great Barrier Reef
Great Dividing Ra.
Australian Alps
Southern Alps
Cook Strait
Tropic of Capricorn
Longitude East from Green.

rocks yielding good coal. No active volcano is known to exist, but in the southeast there are some craters only recently extinct. The highest and most extensive mountain system is a belt about 150 miles wide skirting the whole eastern and southeastern border of the continent, and often called in whole or in part the Great Dividing Range, from forming the great water-shed of Australia. A part of it, called the Australian Alps, in the southeast, contains the highest summits in Australia, Mount Kosciusko (7328 feet), and Mount Townsend (7260) and lesser peaks. West of the Dividing Range are extensive plains or downs admirably adapted for pastoral purposes. The deserts and scrubs, which occupy large areas of the interior, are a characteristic feature of Australia. The former are destitute of vegetation, or are clothed only with a coarse spiny grass that affords no sustenance to cattle or horses; the latter are composed of a dense growth of shrubs and low trees, often impenetrable till the traveler has cleared a track with his axe.

The rivers of Australia are nearly all subject to great irregularities in volume, many of them at one time showing a channel in which there is merely a series of pools, while at another they inundate the whole adjacent country. The chief is the Murray, which, with its affluents, the Murrumbidgee, Lachlan, and Darling, drains a great part of the interior west of the Dividing Range, and falls into the sea in the south coast (after entering Lake Alexandria). Its greatest tributary is the Darling, which may even be regarded as the main stream. On the east coast are the Hunter, Clarence, Brisbane, Fitzroy, and Burdekin; on the west, the Swan, Murchison, Gascoyne, Ashburton, and De Grey; on the north, the Fitzroy, Victoria, Flinders, and Mitchell. The Australian rivers are of little service in facilitating internal communication. Many of them lose themselves in swamps or sandy wastes of the interior. A considerable river of the interior is Cooper Creek, or the Barcoo, which falls into Lake Eyre, one of a group of lakes on the south side of the continent having no outlet, and accordingly salt. The principal of these are Lakes Eyre, Torrens, and Gairdner, all of which vary in size and saltness according to the season. Another large salt lake of little depth, Lake Amadeus, lies a little west of the center of Australia. Various others of less magnitude are scattered over the interior.

The climate of Australia is generally hot and dry, but very healthy. In the tropical portions there are heavy rains, and in most of the coast districts there is a sufficiency of moisture, but in the interior the heat and drought are extreme. Considerable portions now devoted to pasturage are liable at times to suffer from drought. At Melbourne the mean temperature is about 56°, at Sydney about 63°. The southeastern settled districts are at times subject to excessively hot winds from the interior, which cause great discomfort, and are often followed by a violent cold wind from the south ("southerly bursters"). In the mountainous and more temperate parts snowstorms are common in winter (June, July, and August).

Australia is a region containing a vast quantity of mineral wealth. Foremost come its rich and extensive deposits of gold, first discovered in 1851. The principal mines were in Victoria, New South Wales, and Queensland till 1886, when W. Australia came into prominence with the opening of its first gold field, Kimberley, followed by a second, Yilgarn, in 1888, and the immensely rich Coolgardie in 1892

It also possesses silver copper, tin, lead, zinc, antimony, mercury, plumbago, etc., in abundance, besides coal (now worked to a considerable extent in New South Wales) and iron. Various precious stones are found, as the garnet, ruby, topaz, sapphire, and even the diamond. Of building stone there are granite, limestone, marble, and sandstone.

The Australian flora presents peculiarities which mark it off by itself in a very decided manner. Many of its most striking features have an unmistakable relation to the general dryness of the climate. The trees and bushes have for the most part a scanty foliage, presenting little surface for evaporation, or thick leathery leaves well fitted to retain moisture. The most widely spread types of Australian vegetation are the various kinds of gum-tree (*Eucalyptus*), the she-oak (*Casuarīna*), the acacia or wattle, the grass-tree (*Xanthorrhœa*), many varieties of Proteaceæ, and a great number of ferns and tree-ferns. Of the gum-tree there are found upwards of 150 species, many of which are of great value. Individual specimens of the "peppermint" (*E. amygdalīna*) have been found to measure from 480 to 500 feet in height. As timber-trees the most valuable members of this genus are the *E. rostrāta* (or red-gum), *E. leucoxylon*, and *E. margināta*, the timber of which is hard, dense, and almost indestructible. A number of the gum-trees have deciduous bark. The wattle or acacia includes about 300 species, some of them of con-

siderable economic value, yielding good timber or bark for tanning. The most beautiful and most useful is that known as the golden wattle (*A. pycnantha*), which in spring is adorned with rich masses of fragrant yellow blossoms. Palms—of which there are 24 species, all, except the cocoa-palm, peculiar to Australia—are confined to the north and east coasts. In the 'scrubs' already mentioned hosts of densely intertwisted bushes occupy extensive areas. The *mallee* scrub is formed by a species of dwarf eucalyptus, the *mulga* scrub by a species of acacia (*A. aneura*). A plant covering large areas in the arid regions is the *spinifex* or porcupine grass, a hard, coarse and excessively spiny plant, which renders traveling difficult, wounds the feet of horses, and is utterly uneatable by any animal. Other large tracts are occupied by herbs or bushes of a more valuable kind, from their affording fodder. Foremost among those stands the salt-bush (*Atriplex nummularia*, order Chenopodiaceæ). Beautiful flowering plants are numerous. Australia also possesses great numbers of turf-forming grasses, such as the kangaroo-grass (*Anthistiria australis*), which survives even a tolerably protracted drought. The native fruit-trees are few and unimportant, and the same may be said of the plants yielding roots used as food; but exotic fruits and vegetables may now be had in the different colonies in great abundance and of excellent quality. The vine, the olive, and mulberry thrive well, and quantities of wine are now produced. The cereals of Europe and maize are extensively cultivated, and large tracts of country, particularly in Queensland, are under the sugar-cane.

The Australian fauna is almost unique in its character. Its great feature is the nearly total absence of all the forms of mammalia which abound in the rest of the world, their place being supplied by a great variety of marsupials—these animals being nowhere else found, except in the opossums of America. There are about 110 kinds of marsupials (of which the kangaroo, wombat, bandicoot, and phalangers or opossums, are the best-known varieties), over twenty kinds of bats, a wild dog (the dingo), and a number of rats and mice. Two extraordinary animals, the platypus, or water-mole of the colonist (Ornithorhynchus), and the porcupine ant-eater (Echidna) constitute the lowest order of mammals (Monotremata), and are confined to Australia. Their young are produced from eggs. Australia now possesses a large stock of the domestic animals of Britain, which thrive there remarkably well. The breed of horses is excellent. Horned cattle and sheep are largely bred, the first attaining a great size, while the sheep improve in fleece and their flesh in flavor. There are upwards of 650 different species of birds, the largest being the emu, or Australian ostrich, and a species of cassowary. Peculiar to the country are the black-swan, the honey-sucker, the lyre-bird, the brush-turkey, and other mound-building birds, the bower-birds, etc. The parrot tribe preponderates over most other groups of birds in the continent. There are many reptiles, the largest being the alligator, found in some of the northern rivers. There are upwards of 60 different species of snakes, some of which are very venomous. Lizards, frogs, and insects are also numerous in various parts. The seas, rivers, and lagoons abound in fish of numerous varieties, and other aquatic animals, many of them peculiar. Whales and seals frequent the coasts. On the N. coasts are extensive fisheries of trepang, much visited by native traders from the Indian Archipelago. Some animals of European origin, such as the rabbit and the sparrow, have developed into real pests in several of the colonies.

The natives belong to the Australian negro stock, and are sometimes considered the lowest as regards intelligence in the whole human family, though this is doubtful. They are of a dark-brown or black color, with jet-black curly but not woolly hair, of medium size, but inferior muscular development. In the settled parts of the continent they are inoffensive, and rapidly dying out. They have no fixed habitations; in the summer they live almost entirely in the open air, and in the more inclement weather they shelter themselves with bark erections of the rudest construction. They have no cultivation and no domestic animals. Their food consists of such animals as they can kill, and no kind of living creature seems to be rejected, snakes, lizards, frogs, and even insects being eaten, often half raw. They are ignorant of the potter's art. In their natural condition they wear little or no clothing. They speak a number of different languages or dialects. The women are regarded merely as slaves, and are frightfully maltreated. They have no religion; they practice polygamy, and are said to sometimes resort to cannibalism, but only in exceptional circumstances. They are occasionally employed by the settlers in light kinds of work, and as horse-breakers; but they dislike continuous occupation, and soon give it up. The weapons of all the tribes are gener-

ally similar, consisting of spears, shields, boomerangs, wooden axes, clubs and stone hatchets. Of these the boomerang is the most singular. In 1913 it was estimated that there were 80,000 full-blooded aboriginals in Australia.

Prior to the establishing of the commonwealth, there were six separate colonies on the island of Australia, each having a parliament of its own. In 1885 a measure was passed by the imperial parliament to enable the whole of the Australasian colonies to federate. This was accomplished by legislation from 1894 onward, the new commonwealth of Australia beginning its career January 1, 1901. The parliament of the commonwealth consists of a Senate of thirty-six members, six from each State, elected by the people, not by the State legislatures; and a Representative Chamber composed of members whose number is proportionate to the population, elected every three years by the people. There is a Governor-general appointed by the British sovereign, with powers somewhat more extensive than those of the U. S. President. There is no established church in any of the colonies. The denomination which numbers most adherents is the English or Anglican Church, next to which come the Roman Catholics, Presbyterians, and Methodists. Education is well provided for, instruction in the primary schools being in some cases free and compulsory, and the higher education being more and more attended to. There are flourishing universities in Melbourne, Sydney, and Adelaide. Newspapers are exceedingly numerous, and periodicals of all kinds are abundant. There is as yet no native literature of any distinctive type, but names of Australian writers of ability both in prose and poetry are beginning to be known beyond their own country.

Pastoral and agricultural pursuits and mining are the chief occupations of the Australians, though manufactures and handicrafts also employ large numbers. For sheep-rearing and the growth of wool Australia stands unrivaled, and while the production of gold since 1904 has steadily declined that of wool is constantly on the increase. The great bulk of the wool goes to Great Britain, whence Australia receives her chief supplies of manufactured goods in return for wool, gold, preserved meat, and other products. Next to wool come gold, tin, copper, wheat, meat, tallow, hides and skins, cotton, tobacco, sugar and wine as the most important items of export. The chief imports consist of textile fabrics, haberdashery and clothing, machinery and metal goods. There are upwards of 20,000 miles of railway in operation, most of them government owned. The 1000-mile link from Kalgoorlie to Port Augusta in the great transcontinental system was completed in October, 1917, establishing through connection between Sydney, Melbourne, Adelaide and across the continent to Perth. The railroad is 3467 miles in length. There are numerous telegraph lines, some 46,000 miles of line being recorded for 1913. The first official wireless station was opened at Melbourne in 1912. The coinage is the same as in Great Britain. Banks and banking offices are numerous, including post-office or other savings banks for the reception of small sums. The opening of the Panama Canal (1914) provided a new route for Australian shipping destined for the Atlantic coast of the United States or Europe.

It is doubtful when Australia was first discovered by Europeans. Between 1531 and 1542 the Portuguese published the existence of a land which they called Great Java, and which corresponded to Australia, and probably the first discovery of the country was made by them early in the sixteenth century. The first authenticated discovery is said to have been made in 1601, by a Portuguese named Manoel Godinho de Eredia. In 1606 Torres, a Spaniard, passed through the strait that now bears his name, between New Guinea and Australia. Between this period and 1628 a large portion of the coast-line of Australia was surveyed by various Dutch navigators. In 1664 the continent was named New Holland by the Dutch government. In 1688 Dampier coasted along part of Australia, and about 1700 explored a part of the W. and N. W. coasts. In 1770 Cook carefully surveyed the E. coast, named a number of localities, and took possession of the country for Britain. He was followed by Bligh in 1789, who carried on a series of observations on the N. E. coast, adding largely to the knowledge already obtained of this new world. Colonists had now arrived on the soil, and a penal settlement was formed (1788) at Port Jackson. In this way was laid the foundation of the future colony of New South Wales. The Moreton Bay district (Queensland) was settled in 1825; in 1835 the Port Phillip district. In 1851 the latter district was erected into a separate colony under the name of Victoria. Previous to this time the colonies both of Western Australia and of South Australia had been founded—the former in 1829, the latter in 1836. Queensland was founded in 1859.

Australia stood solidly with the mother country in the European war (*q. v.*) and in addition to raising contingents for as-

sistance in Europe, took strong action in her own part of the world. Kaiser Wilhelm Land in German New Guinea was captured by the Australians in September, 1914; the Bismarck archipelago also fell into their hands; and the Carolines, which were taken by Japan, were turned over to Australia. The splendid deeds of the Australian and New Zealand Army Corps (the Anzacs) at the Dardanelles will long be remembered. (See *Gallipoli.*) Australia declined to adopt conscription (q. v), but raised a splendid army of some 300,000 men by voluntary enlistment. In aeronautics (q. v.) Australia made a great record in 1919. Harry Hawker was the first to attempt a non-stop transatlantic flight, May 18. Capt. Ross Smith, another Australian, flew from England to Australia, Nov. 12–Dec. 10, winning the £10,000 prize.

Australian Ballot. See *Ballot.*

Austria (ąs'tri-a; in German, *Oesterreich,* that is, Eastern Empire), a country of central Europe, formerly part of Austria-Hungary (see following article), now a separate state, with an area of about thirty-two thousand square miles, and a population of between six and seven million. It is bounded by Switzerland and Lichtenstein on the west, Italy and the Serb-Croat-Slovene state (Jugo-Slavia) on the south, Hungary on the east, the Czecho-Slovak state (Czecho-Slovakia) on the north, and Germany on the north and west. The treaty of peace with Austria (September, 1919) provided for boundary commissions to trace the new frontiers on the ground. Capital, Vienna.

The history of Austria up till the date of the armistice, November 3, 1918, will be found in the article on Austria-Hungary. The proclamation announcing the abdication of Charles I, as Emperor of Austria-Hungary, was issued November 11, 1918. Attempts were made to oust the conservative government, which had organized a republic under the presidency of Karl Seitz, and replace it with a Bolshevik government, but these efforts were put down in spite of the vigorous propaganda work of the Communists of Hungary, who had temporarily taken control of that state. An incomplete draft of the treaty of peace was handed to the Austrian delegation, headed by Dr. Karl Renner, Chancellor, on June 2, 1919, at St. Germain, Paris. The terms of the treaty were harsh, and at a session of the National Assembly President Seitz characterized the treaty as Austria's death sentence. The Communists took advantage of the popular indignation, and it was with great difficulty they were quelled. The Austrian delegates were again summoned to St. Germain, and on July 20 received the complete text of the treaty. On September 7 the Austrian National Assembly, by a vote of 97 to 23, resolved to sign the treaty though protesting against 'the violation of Austria's right of free disposal of herself.' There was a strong desire among the Austrians to unite with the German Republic, a desire that was reciprocated by the Germans, but the treaties forbade this union. On September 10, 1919, Dr. Karl Renner signed the treaty at St. Germain. By its terms the former Austrian Empire was reduced to what is known as German Austria, including Upper and Lower Austria and parts of Styria and Tyrol. The indemnities which Austria must pay were to be decided by the Reparation Commission. The Austrian army was reduced to 30,000 and conscription abolished. (See *Treaty.*) Ex-Emperor Charles, who was exiled to the island of Madeira with his wife Princess Zita, died there on April 1, 1922, in his 35th year.

Austria-Hungary, formerly an extensive duplex monarchy in Central Europe inhabited by several distinct nationalities, and consisting of two independent states, each with its own parliament and government, but with one common head of the state, who bore the title of Emperor of Austria and Apostolic King of Hungary, and with a common army and navy and system of diplomacy, and also with a common parliament. At the beginning of the European war (q. v.) Austria-Hungary had a total area of about 260,000 square miles. It was bounded S. by Roumania, Servia, and Montenegro; W. by the Adriatic Sea, Italy, Switzerland and the German Empire; E. by Russia and Roumania; N. by the German Empire and Russia.

Besides the two great divisions of Austria proper, or 'Cisleithan' Austria and Hungary or 'Transleithan' Austria, the Austro-Hungarian monarchy was divided into a number of governments or provinces as follows:

Austrian Empire: Lower Austria, Upper Austria, Salzburg, Styria, Carinthia, Carniola, Triest, Görz and Gradisca, Istria, Tyrol, Vorarlberg, Bohemia, Moravia, Silesia, Galicia, Bukowina, Dalmatia. Pop. 28,571,934.

Hungarian Kingdom: Hungary, Transylvania, Fiume, Croatia and Slavonia. Pop. 20,886,487.

Belonging to the former Austro-Hungarian monarchy: Bosnia, Herzegovina. Pop. 1,931,802.

The Austrian Empire had an area of 115,831 square miles; the Hungarian Kingdom, 125,641 square miles; Bosnia

CZECHOSLOVAKIA, AUSTRIA, HUNGARY AND NORTHERN YUGOSLAVIA
Scale of Miles
0 25 50 75 100 125
Railroads
Canals
Submarine Telegraph Lines
Capitals
Size of type indicates relative importance of places
Longitude 18° East from Greenwich
C.S. HAMMOND & CO., N.Y.
Prague
Vienna
Budapest
Trieste
Belgrade
Sarajevo
Bukharest
Sofia
Adriatic Sea
Danube
Carpathian Mts.
Transylvanian Alps
Dinaric Alps
Apennines

and Herzegovina, 19,769 square miles; total area of late dual monarchy, 261,241; total population, 51,390,223.

The great war of 1914-18 (see *European War*), resulted in the dismemberment of this great empire, part of it going to Italy, part to Roumania, part to the reconstructed state of Poland, the remainder being divided into the separate states of Austria, Czecho-Slovakia, Hungary, and Jugo-Slavia (the Serb-Croat-Slovene State). See the articles under each head.

The prevailing character of the territory formerly included in Austria-Hungary is mountainous or hilly, the plains not occupying more than a fifth part of the whole surface. The loftiest ranges belong to the Alps, and are found in Tyrol, Styria, Salzburg, and Carinthia, the highest summits being the Ortlerspitze (12,814 ft.) on the western boundary of Tyrol, and the Grossplockner (12,300) on the borders of Salzburg, Tyrol and Carinthia. Another great range is that of the Carpathians, bounding Hungary on the north. The most extensive tracts of low or flat land, much of which is very fertile, occur in Hungary, Galicia, and Slavonia, the great Hungarian plain having an area of 36,000 square miles. They stretch along the courses of the rivers, of which the chief are the Danube, with its tributaries, the Save, the Drave, the Theiss, the Maros, the Waag, the March, the Raab, the Inn; also the Elbe and Moldau and the Dniester. The Danube for upwards of 800 miles is navigable for fairly large vessels; the tributaries also are largely navigable. The lakes are numerous and often picturesque, the chief being Lake Balaton or the Plattensee. The climate is exceedingly varied, but generally favorable. The principal products of the north are wheat, barley, oats, and rye; in the center vines and maize are added; and in the south olives and various fruits. The cereals grow to perfection, Hungarian wheat and flour being celebrated. Other crops are hops, tobacco, flax, and hemp. Wine is largely made, but the wines are inferior on the whole, with exception of a few kinds, including Tokay. The forests cover 70,000 square miles, or one-third of the productive soil of the empire. Sheep and cattle are largely reared.—Wild deer, wild swine, chamois, foxes, lynxes, and a species of small black bear are found in many districts, the fox and lynx being particularly abundant. Herds of a small native breed of horses roam wild over the plains of Hungary.—In mineral productions the territory is very rich, possessing, with the exception of platinum, all the useful metals, the total annual value of the mineral products of the Austrian Empire being estimated at upwards of $60,000,000, the principal being coal, salt, and iron.

At the beginning of the war manufactures were in the most flourishing condition in Bohemia, Moravia, Silesia, and Lower Austria; less so in the eastern provinces, and insignificant in Dalmatia, Bukowina, Herzegovina, etc. Among the most important manufactures were those of machinery and metal goods, Austria holding a high place for the manufacture of musical and scientific instruments, gold and silver plate, and jewelry; of stone and china-ware, and of glass, which is one of the oldest and most highly developed industries in Austria; of chemicals; of sugar from beet; of beer, spirits, etc., and especially the manufactures of tobacco, woolen, cotton, hemp, and flax.

None of the European States, except Russia, exhibited such a diversity of race and language as the former Austrian Empire. The Slavs—who differ greatly, however, among themselves in language and civilization — amounted to above 22,000,000 or nearly half the total population, and form a great mass of the population of Bohemia, Moravia, Carniola, Galicia, Dalmatia, Croatia, and Slavonia, and Northern Hungary, and half the population of Silesia and Bukowina. The Germans, about 11,500,000, form almost the sole population of Austria, Salzburg, the greatest portion of Styria and Carinthia, almost the whole of Tyrol and Vorarlberg, large portions of Bohemia and Moravia, the whole of West Silesia, etc.; and they are also numerous in Hungary and Transylvania. The Magyars or Hungarians (8,750,000) form the bulk of the inhabitants of the Kingdom (now the Republic) of Hungary and Eastern Transylvania. Of the Italic or Western Romanic stock there are about 700,000, and in the southeast about 3,000,000 of the Roumanian or Eastern Romanic stock. The number of Jews is above 1,000,000; and there are other races, such as the Gypsies (100,000), who are most numerous in Hungary and Transylvania, and the Albanians in Dalmatia.

Government.—The ruler of the Austro-Hungarian monarchy had the title of emperor so far as concerned his Austrian dominions, but he was only king of Hungary. All matters affecting the joint interests of the two divisions of the empire, such as foreign affairs, war, and finance, were dealt with by a supreme body known as the Delegations—a parliament of 120 members, one-half of whom were chosen by and represented the legislature of German Austria and the other half that of Hungary. The legislative center of the Austrian division of the empire was the Reichsrath, or council of the realm, consisting of an upper house (Herrenhaus),

composed of princes of the imperial family, nobles with the hereditary right to sit, archbishops and life-members nominated by the emperor; and a lower house (Abgeordnetenhaus) of 516 elected deputies. There were seventeen provincial diets or assemblies, each provincial division having one. In the Hungarian division of the empire the legislative power was vested in the king and the diet or Reichstag conjointly, the latter consisting of an upper house or house of magnates and of a lower house or house of representatives, the latter elected by all citizens of full age paying direct taxes to the amount of four dollars a year. The powers of the Hungarian Reichstag corresponded to those of the Reichsrath of the Cisleithan provinces. There being three distinct parliaments in the empire, there were also three budgets, viz., that for the whole empire, that for Cisleithan, and that for Transleithan Austria.

Military service was obligatory on all citizens capable of bearing arms who had attained the age of twenty. The period of service was twelve years, of which three were passed in the line, seven in the reserve, and two in the landwehr. The army numbered over 400,000 men (including officers) on the peace footing and over 3,600,000 on the war footing. The Austrian navy at the time of the armistice of November, 1918, consisted of 15 battleships, 21 torpedo boat destroyers, 10 torpedo gunboats, 45 submarines, besides monitors, scouts, etc. All warships were surrendered in accordance with the peace treaty of 1919. (See *Treaty.*)

History.—In 791 Charlemagne drove the Avars from the territory between the Ens and the Raab, and united it to his empire under the name of *the Eastern Mark* (that is March or boundary land); and from the establishment by him of a margraviate in this new province the present empire took its rise. On the invasion of Germany by the Hungarians it became subject to them from 900 till 955, when Otho I, by the victory of Augsburg, reunited a great part of this province to the German Empire, which by 1043 had extended its limits to the Leitha. The margraviate of Austria was hereditary in the family of the counts of Babenberg (Bamberg) from 982 till 1156, in which year the boundaries of Austria were extended so as to include the territory above the Ens and the whole was created a duchy. The territory was still further increased in 1192 by the gift of the duchy of Styria as a fief from the Emperor Henry VI, Vienna being by this time the capital. The male line of the house of Bamberg became extinct in 1246, and the Emperor Frederick II declared Austria and Styria a vacant fief, the hereditary property of the German emperors. In 1282 the Emperor Rudolph granted Austria, Styria, and Carinthia to his two sons, Albert and Rudolph. The former became sole ruler (duke), and since then Austria has been under the still reigning house of Hapsburg. Albert, who was an energetic ruler, was elected emperor in 1298, but was assassinated in 1308. The first of his successors, we need specially mention, was Albert V, son-in-law of the Emperor Sigismund. He assisted Sigismund in the Hussite wars, and was elected after his death King of Hungary and of Bohemia, and German King (1438). Ladislaus, his posthumous son, was the last of the Austrian line proper, and its possessions devolved upon the collateral Styrian line in 1457; since which time the house of Austria furnished an unbroken succession of German emperors.

In 1453 the Emperor Frederick III, a member of this house, had conferred upon the country the rank of an archduchy before he himself became ruler of all Austria. His son Maximilian I, by his marriage with Mary, the surviving daughter of Charles the Bold, united the Netherlands to the Austrian dominions. After the death of his father in 1493 Maximilian was made Emperor of Germany, and transferred to his son Philip the government of the Netherlands. He also added to his paternal inheritance Tyrol, with several other territories, particularly some belonging to Bavaria, and acquired for his family new claims to Hungary and Bohemia. The marriage of his son Philip to Joanna of Spain raised the house of Hapsburg to the throne of Spain. Philip, however, died in 1506, and the death of Maximilian in 1519 was followed by the union of Spain and Austria; his grandson (the eldest son of Philip), Charles I, king of Spain, being elected Emperor of Germany as Charles V. Charles thus became the greatest monarch in Europe, but in 1521 he ceded to his brother Ferdinand all his dominions in Germany. Ferdinand I, by his marriage with Anna, the sister of Louis II, king of Hungary, acquired the kingdoms of Hungary and Bohemia, with Moravia, Silesia, and Lusatia, the appendages of Bohemia. To oppose him the waywode of Transylvania, John Zapolya, sought the help of the sultan, Soliman II, who appeared in 1529 at the gates of Vienna, but was compelled to retreat. In 1535 a treaty was made by which John von Zapolya was allowed to retain the royal title and half of Hungary.

but after his death new disputes arose, and Ferdinand maintained the possession of Lower Hungary only by paying Soliman the sum of 30,000 ducats annually (1562). In 1556 Ferdinand obtained the imperial crown, when his brother Charles laid by the scepter for a cowl. He died in 1564, leaving his territories to be divided among his three sons.

Maximilian II, the eldest, succeeded his father as emperor, obtaining Austria, Hungary, and Bohemia; Ferdinand, the second son, received Tyrol and Hither Austria; and Charles, the youngest, obtained Styria, Carinthia, Carniola, and Görz. Maximilian died in 1576, and was succeeded in the imperial throne by his eldest son Rudolph II, who had already been crowned King of Hungary in 1572, and King of Bohemia, in 1575. Rudolph's reign was distinguished by the war against Turkey and Transylvania; the persecutions of the Protestants, who were driven from his dominions; the cession of Hungary in 1608; and in 1611 of Bohemia and his hereditary estates in Austria to his brother Matthias. Matthias, who succeeded Maximilian on the imperial throne, concluded a peace with the Turks, but was disturbed by the Protestant Bohemians, who took up arms in defense of their religious rights, thus commencing the Thirty Years' War. After his death in 1619 the Bohemians refused to acknowledge his successor, Ferdinand II, until after the battle of Prague in 1620, when Bohemia had to submit, and was deprived of the right of choosing her king. Lutheranism was strictly forbidden in all the Austrian dominions. Hungary, which revolted under Bethlen Gabor, Prince of Transylvania, was, after a long struggle, subdued. During the reign of Ferdinand III (1637–57), successor of Ferdinand II, Austria was continually the theater of war; Lusatia was ceded to Saxony in 1635; and Alsace to France in 1648, when peace was restored in Germany by the treaty of Westphalia.

The Emperor Leopold I, son and successor to Ferdinand III, was victorious through the talents of Eugene in two wars with Turkey, and Vienna was delivered by Sobieski and the Germans from the attacks of Kara Mustapha in 1683. In 1687 he united Hungary to Transylvania, and in 1699 restored to Hungary the country lying between the Danube and the Theiss. It was the chief aim of Leopold to secure to Charles, his second son, the inheritance of the Spanish monarchy, and in 1701, upon the victory of French diplomacy in the appointment of the grandson of Louis XIV, the war of the Spanish succession commenced. Leopold died in 1705, but Joseph I, his eldest son, continued the war. As he died without children in 1711, his brother Charles was elected emperor, but was obliged to accede in 1714 to the Peace of Utrecht, by which Austria received the Netherlands, Milan, Mantua, Naples, and Sardinia. In 1720 Sicily was given to Austria in exchange for Sardinia. This monarchy now embraced over 190,000 square miles; but its power was weakened by new wars with Spain and France. In the peace concluded at Vienna (1735 and 1738) Charles was forced to cede Naples and Sicily to Spain and part of Milan to the King of Sardinia; and in 1739, by the Peace of Belgrade, he was obliged to transfer to the Porte Belgrade, Servia, etc., partly in order to secure the succession to his daughter Maria Theresa by the Pragmatic Sanction. He died in 1740.

On the marriage of Maria Theresa with Francis, Duke of Lorraine (the dynasty henceforth being that of Hapsburg-Lorraine), and her accession to the Austrian throne, the empire was threatened with dismemberment. Frederick II of Prussia subdued Silesia; the Elector of Bavaria was crowned in Lintz and Prague, and in 1742 chosen emperor under the name of Charles VII; Hungary alone supported the heroic and beautiful queen. Charles, however, died in 1745, and the husband of Theresa was crowned Emperor of Germany as Francis I; but a treaty concluded in 1745 confirmed to Frederick the possession of Silesia and by the Peace of Aix-la-Chapelle, 1748, Austria was obliged to cede the duchies of Parma, Piacenza, and Guastalla to Philip, Infant of Spain, and several districts of Milan to Sardinia. To recover Silesia Maria Theresa formed an alliance with France, Russia, Saxony, and Sweden, and entered upon the Seven Years' War; but by the Peace of Hubertsberg, 1763, Silesia was recognized as Prussian territory. On the death of Francis I in 1765 Joseph II, his eldest son, was appointed to assist his mother in the government and elected Emperor of Germany. The partition of Poland (1772) gave Galicia and Lodomeria to Austria, which also obtained Bukowina from the Porte in 1777. At the death of the empress in 1780 Austria contained 235,000 square miles with a pop. estimated at 24,000,000.

The liberal home administration of the empress was continued and extended by her successor, Joseph II, who did much to further the spread of religious toler-

ance, education, and the industrial arts. The Low Countries, however, revolted, and he was unsuccessful in the war of 1788 against the Porte. His death took place in 1790. He was succeeded by his eldest brother, Leopold II, under whom peace was restored in the Netherlands and in Hungary, and also with the Porte. Actuated by the threat of war from the French Assembly in 1792, he formed an alliance with Prussia, but died, March 1, before the French revolutionary war broke out.

His son Francis II, succeeded, and was elected German emperor, by which time France had declared war against him as King of Hungary and Bohemia. In 1795, in the third division of Poland, West Galicia fell to Austria, and by the Peace of Campo-Formio (1797) she received the largest part of the Venetian territory as compensation for her loss of Lombardy and the Netherlands. In 1799 Francis, in alliance with Russia, renewed the war with France until 1801, when the peace of Lunéville was concluded. In 1804 Francis declared himself hereditary Emperor of Austria as Francis I, and united all his states under the name of the Empire of Austria, immediately taking up arms once more with his allies Russia and Great Britain against France. The war of 1805 was terminated by the Peace of Pressburg (Dec. 26), by which Francis had to cede to France the remaining provinces of Italy, as well as to give up portions of territory to Bavaria, Wurtemberg, and Baden, receiving in return Salzburg and Berchtesgaden. After the formation of the Confederation of the Rhine (July 12, 1806) Francis was forced to resign his dignity as Emperor of Germany, which had been in his family more than 500 years. A new war with France in 1809 cost the monarchy 42,380 square miles of territory and 3,500,000 subjects. Napoleon married Maria Louisa, daughter of the emperor, and in 1812 concluded an alliance with him against Russia. But in 1813 Francis again declared war against France, and formed an alliance with Britain, Russia, Prussia, and Sweden against his son-in-law. By the Congress of Vienna (1815) Austria gained Lombardy and Venetia, and recovered, together with Dalmatia, the hereditary territories which it had been obliged to cede.

In the troubled period following the French revolution of 1830 insurrections took place in Modena, Parma, and the Papal States (1831–32), but were suppressed without much difficulty; and though professedly neutral during the Polish insurrections Austria clearly showed herself on the side of Russia, with whom her relations became more intimate as those between Great Britain and France grew more cordial. The death of Francis I (1835) and accession of his son Ferdinand I made little change in the Austrian system of government, and much discontent was the consequence. In 1846 the failure of the Polish insurrection led to the incorporation of Cracow with Austria. In Italy the declarations of Pio Nono in favor of reform increased the difficulties of Austria, and in Hungary the opposition under Kossuth and others assumed the form of a great constitutional movement. In 1848, when the expulsion of Louis Philippe shook all Europe, Metternich found it impossible any longer to guide the helm of state, and the government was compelled to admit a free press and the right of citizens to arms. Apart from the popular attitude in Italy and in Hungary, where the diet declared itself permanent under the presidency of Kossuth, the insurrection made equal progress in Vienna itself, and the royal family, no longer in safety, removed to Innsbruck. After various ministerial changes the emperor abdicated in favor of his nephew, Francis Joseph; more vigorous measures were adopted; and Austria, aided by Russia, reduced Hungary to submission.

The year 1855 is memorable for the Concordat with the pope, which put the educational and ecclesiastical affairs of the empire entirely into the hands of the Papal see. In 1859 the hostile intentions of France and Sardinia against the possessions of Austria in Italy became so evident that she declared war by sending an army across the Ticino; but after disastrous defeats at Magenta and Solferino she was compelled to cede Milan and the northwest portion of Lombardy to Sardinia. In 1864 she joined with the German states in the spoliation of Denmark, but a dispute about Schleswig-Holstein involved her in a war with her allies (1866), while at the same time Italy renewed her attempts for the recovery of Venice. The Italians were defeated at Custozza and driven back across the Mincio; but the Prussians, victorious at Königgrätz (or Sadowa), threatened Vienna. Peace was concluded with Prussia on Aug. 23 and with Italy on Oct. 3, the result of the war being the cession of Venetia through France to Italy and the withdrawal of Austria from all interference in the affairs of Germany.

Since 1866 Austria has been occupied chiefly with the internal affairs of the

empire. Hungarian demands for self-government were finally agreed to, and the Empire of Austria divided into the two parts already mentioned—the Cisleithan and the Transleithan. This settlement was consummated by the coronation of the Emperor Francis Joseph I, at Budapest, as King of Hungary, on the 8th of June, 1867. During the war between Russia and Turkey in 1877-78 Austria remained neutral; but at its close, in the middle of 1878, it was decided at the Congress of Berlin, that the provinces of Bosnia and Herzegovina should be administered by Austria.

The annexation of Bosnia and Herzegovina by Austria in 1908 was bitterly resisted by Servia. The Servians had long cherished the ambition of becoming the center of a great Slavonic dominion. This little race, surrounded by powerful neighbors, aimed high and knew no fear. This great ambition interfered with the aims of Austria, for the Austrians, following the annexation of Bosnia and Herzegovina, might be expected to extend their control of Balkan states. Thus there smoldered an undercurrent of hatred between the two countries. A vast amount of material good was accomplished by Austria in the annexed provinces; she brought law, order, industry; cities were rebuilt; fresh trade started; coal mines worked; schools opened—but in spite of this material prosperity the people were dissatisfied. They declared in a petition to the Hague conference that 'the Austrian domination is a thousand times more insupportable than that of the Turks.' This conflict of ambitions culminated in the great war that spread over the world.

On Sunday, June 28, 1914, a student named Prinzep, shot and killed the Archduke Francis Ferdinand, heir to the Austria-Hungary throne, and his wife, the Duchess of Hohenberg, in Serajevo, the capital of Bosnia. Austria, affirming that the Servian government had abetted the crime, put forward certain demands, some of which Servia refused to comply with, and a declaration of war followed. The conflict involved nearly all the nations of the earth. See *European War*. The emperor, Francis Joseph, died November 21, 1916, and was succeeded by Charles I, who abdicated in November, 1918. The war ended in the overthrow of Austria-Hungary and the disruption of the empire. See *Austria, Hungary, Czechoslovakia, Jugo-Slavia.*

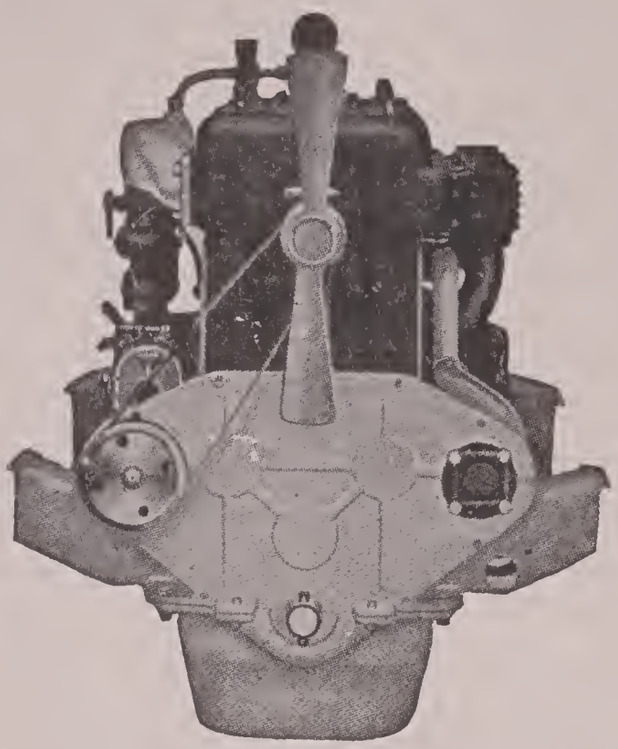
Auto Da Fe (ou'tō-dȧ-fā'), or AUTO DE FE, lit. 'act of faith.' See *Inquisition.*

Autograph (ą'tō-graf), a person's own handwriting; an original manuscript or signature, as opposed to a copy. The practice of collecting autographs or signatures dates at least from the sixteenth century, among the earliest collections known being those of Loménie de Brienne and Lacroix du Maine.

Autointoxication (Gr. *autos*, self, *toxikon*, a poison), is a term used to denote any disturbance of the normal functions of the body brought about by excess, deficiency, or any other perversion of metabolism. Chemical changes are forever going on in the body; as a result of these changes, substances are being broken up, new substances are being formed, and waste products are constantly being disposed of. If, by any chance, or for any pathological reason, these waste products are retained in the body, a process of poisoning results—this is autointoxication. Thus, retention within the body of urine, or feces, of carbon dioxide, etc., produce well-known symptoms of distress; but similar symptoms and similar conditions may also be caused by the action of bacteria within the body. So, too, excessive formation of certain substances (such as occurs in over activity of the thyroid gland), which is another form of lack of elimination, produces a like condition of 'self-poisoning.' Common illustrations of autointoxication are constipation, uremia, and puerperal eclampsia. Some writers would also include conditions such as are caused by the partaking of decomposed or partially decomposed canned food; and they make no distinction between trouble of this sort which originates within the body and similar trouble which has its origin outside the body. The uncertainty in the meaning of the term is furtner shown in the varieties of 'classification' indulged in by different writers on the subject.

Automobile (ą-tō-mō'bil or ą-tō-mō-bēl'), a self-propelled vehicle; one moved by other than animal power and adapted to common roads and streets. The term includes vehicles used for passengers and freight, but not traction engines used to draw a train of trucks or vans, nor carriages or cars fitted to travel on special tracks, as railway and street cars. For the origin of vehicles of this type we may go back as far as 1770, when Nicholas Cugnot, a French inventor, built two steam road-carriages, one of which is still in existence in the Conservatoire des Arts et Metiers, at Paris. Several others were produced during the 18th century, one by Oliver Evans of Philadelphia, which propelled itself for some distance through the streets of that city. The first that

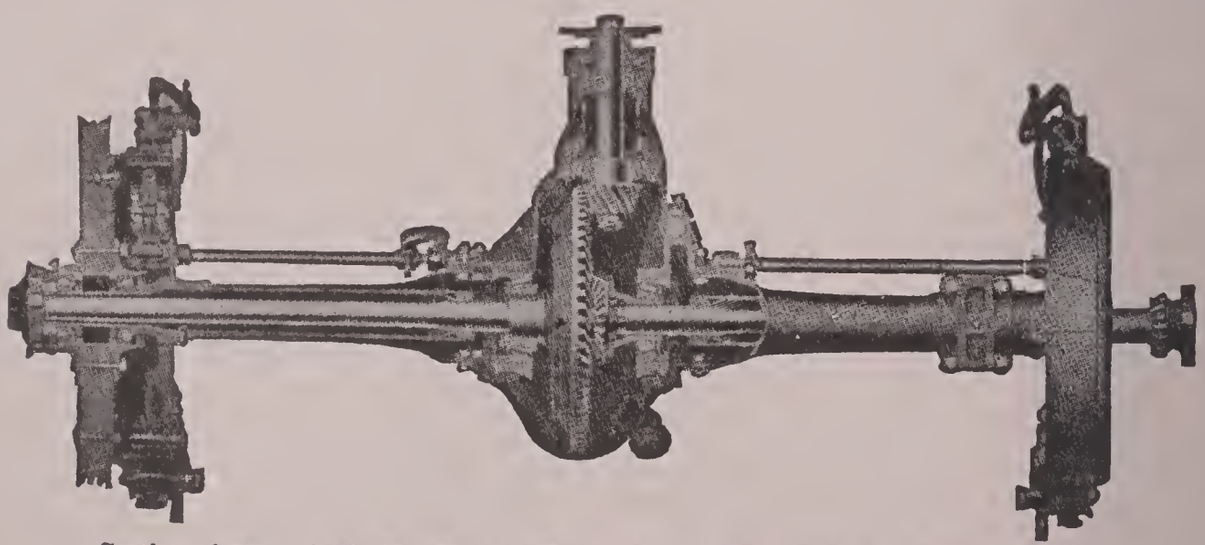
actually ran in England was built by Richard Trevithick in 1802. This propelled itself for 90 miles to London, where



Front view of motor showing fan and timing gear case. At the bottom is the oil reservoir.

it was to be exhibited. Between 1827 and 1837 Walter Henwick produced a number of steam wagons, used for passenger service. One of these, the 'Automaton,' ran for 20 weeks, and carried in all over 12,000 passengers. The modern era of automobile construction began with the perfecting of the internal-combustion engine, with gasoline or naphtha as fuel, and the development of the electric-storage motor battery (*q. v.*). In the final decade of the nineteenth century automobiles of much finer construction and higher speed made their appearance, especially in France, where they became earlier popular than in other countries. The weak construction of these machines and their liability to frequent accidents and breakages stood in the way of their general adoption, and it was not until the earlier years of the twentieth century that they became widely popular. Within recent years they have been greatly perfected in strength and facility of operation and the number of them in use in the United States and elsewhere has grown enormously. Frequent exhibitions and racing contests have added greatly to their popularity, and their power and speed have so greatly increased that stringent laws limiting the speed of travel in cities and on country roads have been enacted for the prevention of accidents. As early as 1902 Angieres, of Paris, made a record mile in 48 seconds, and since then considerably higher speeds have been attained. The highest so far recorded is a mile in 25.40 seconds, on April 23, 1911. Numerous records at greater distances have been made. The fact that the automobile had its early development in France is indicated by the terms employed in the industry, such as *chauffeur*, *garage*, *chassis*, *tonneau*, *limousine*, and a number of others of French origin.

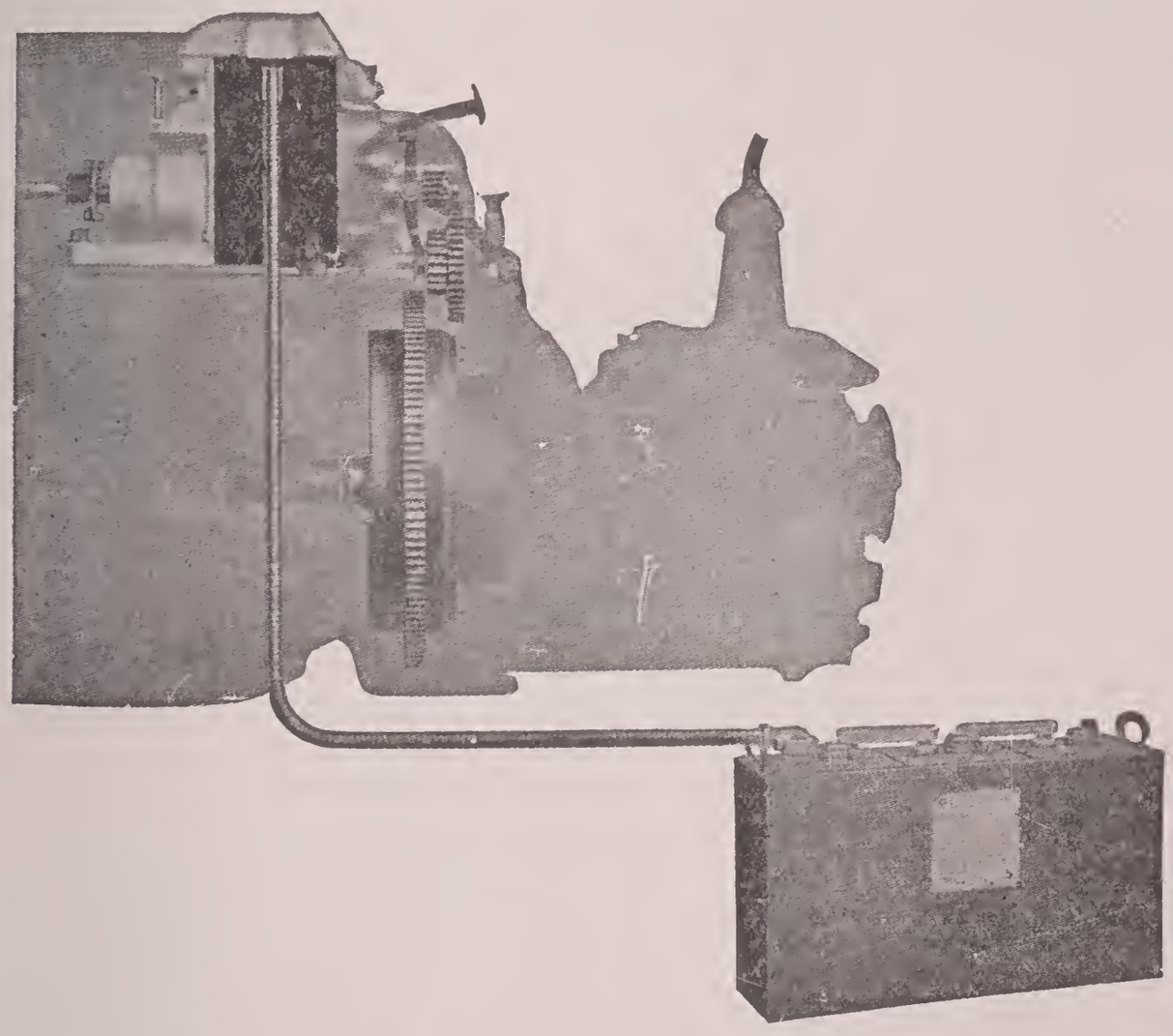
The Automobile Club of France, founded in 1896, with its headquarters in Paris, conducted many international racing events. The Gordon-Bennett Cup was won in 1900 by Charron; speed, 38.5 miles per hour; in 1901 by Girardot, 35.5 miles per hour; in 1902 by S. F. Edge, 34 miles per hour; in 1903 by Tenatzy, 49¼ miles per hour. The Grand Prix superseded the Gordon-Bennett Cup and was won in



Section of rear axle showing spiral bevel driving gears, brakes and wheel bearings.

1906 by Sziss (France), Renault car, 63 miles per hour. In 1907 Nazarro (Italy) won with a Fiat car, 70 miles per hour; in 1908 Lautenschlager (Germany) with a Mercedes car, 62 miles per hour; in 1913 Boillot (France), Peugeot car, 72 miles per hour.

In 1907 a race was run from Pekin to Paris. The route crossed the Gobi desert, Siberia, Russia, and Germany. The start was made on June 10. Prince Borghese



Starting and lighting system showing motor-generator, gears to flywheel and storage battery.

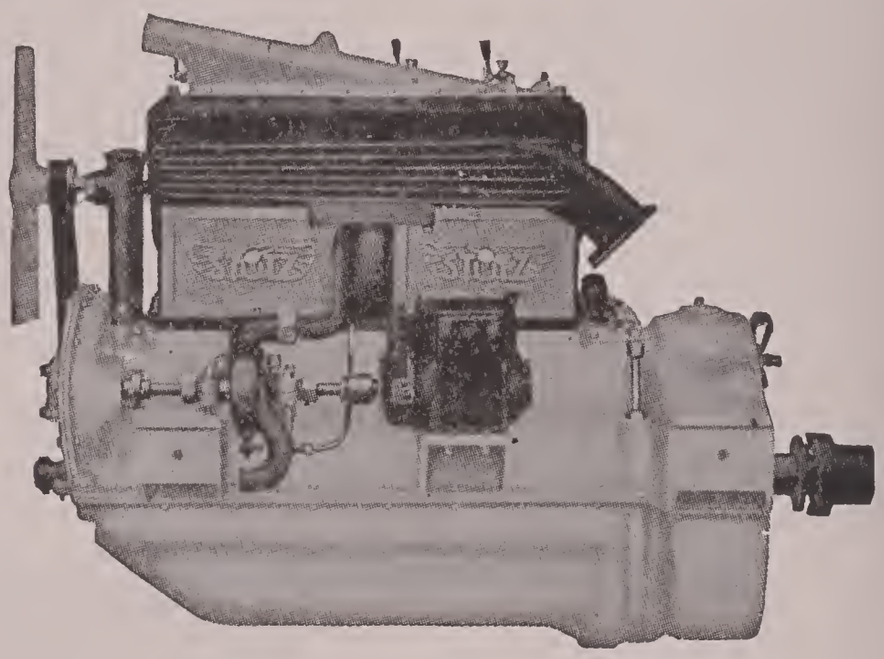
arrived first in Paris, August 10. He used a 40-horsepower Itala car. In 1908 an around-the-world race was won by a Thomas car. The route was New York to San Francisco, ship to China, Pekin to Paris.

In America the Vanderbilt Cup race has been a feature of recent years. In 1911 a 300-horsepower Benz racer traveled one mile at a speed of 141.7 miles an hour at Ormond Beach in Florida.

The honor of having led in the development of the automobile belongs to France. Following the invention of Daimler's gasoline engine which had been fitted to a bicycle in 1885, Panhard and Levassor constructed the first automobile in 1894, using the Daimler motor. It was Levassor who devised the transmission system, which, so far as the general scheme is concerned, has been continued in all makes of cars. He placed his engine in front, the axis of the crank-shaft parallel with the sides of the vehicle. The drive was through a clutch to a set of reduction gears and thence to a differential gear on a countershaft from which the road wheels were chain driven. Except in the case of some makes of heavy trucks there are few chain-driven motor vehicles to-day. But the Levassor combination of clutch, gear box and transmission remains practically unchanged. In 1885 Benz produced a motor tricycle, using a gas engine. Daimler exhibited his double-cylinder V-type engine in 1889, while in 1893-4 Serpollet succeeded with his steam carriage. Electric motors for automobiles were experimented with in this latter period and proved practical. The steam-driven car attained great popularity for

a time, but was displaced by the gasoline engine, though the demand for the "steamer" is becoming evident again. The electric vehicle is more in evidence as a town car and for paved and level streets. The great majority of cars to-day are driven by gasoline engines.

The gasoline automobile may be briefly described as follows: The chassis is the gear and mechanical parts of the car. The body is the upper section erected upon the chassis; it is of various designs. Of the open type, are touring cars, club cars and roadsters; of the glass-enclosed type are limousines, landaulets, coupés, broughams and sedans. At the fore part of the chassis is the motor, usually a four-

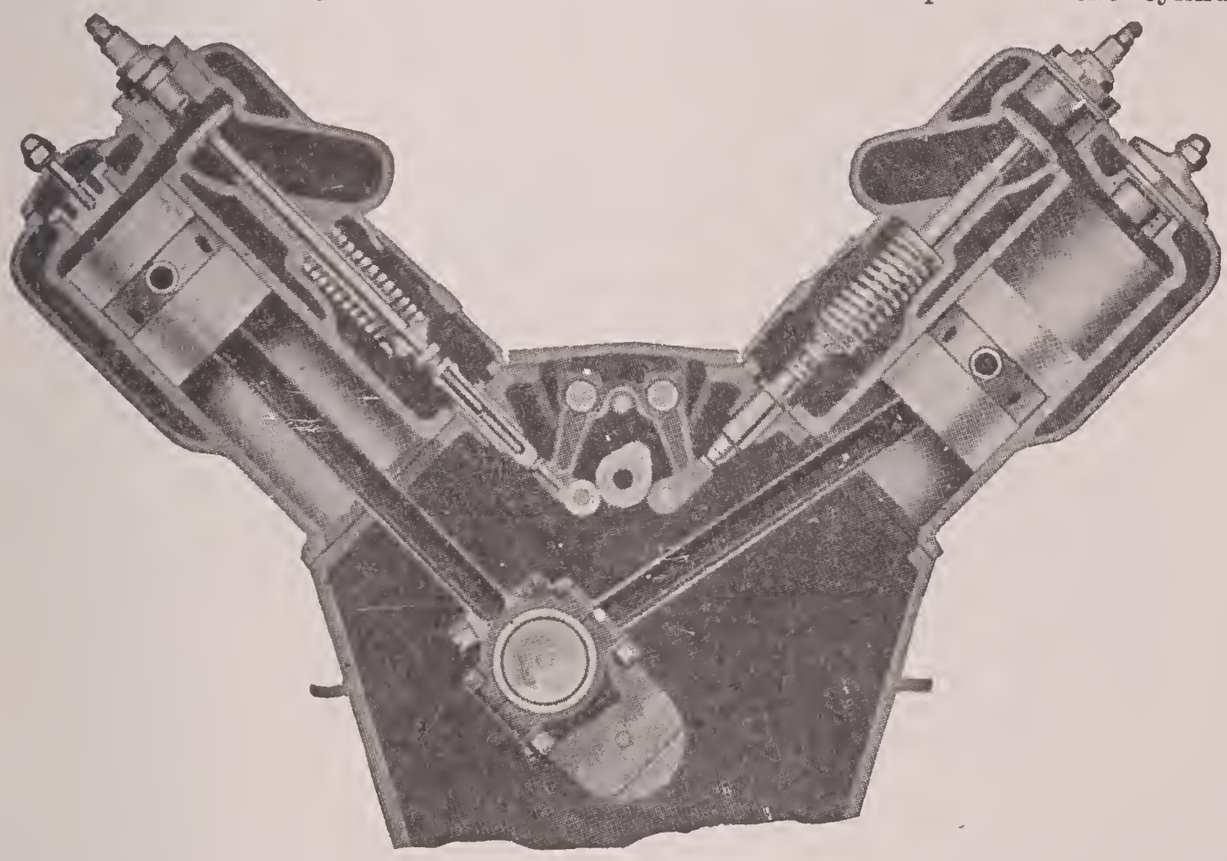


Modern four-cylinder 16-valve motor. Exhaust side showing water pump and electric generator.

or six-cylinder, or more recently an eight-cylinder (two blocks of four cylinders each, at an angle of 90° to each other) or a twin-six (twelve cylinders, arranged in blocks of six at an angle of 60° to each other). The motor has to be provided with several external devices which may be classified as separate systems. There is first a complicated system of gasoline supply, including the supply tank and carburetor or mixing device; secondly, as the engine gets hot in working, the cylinders in which the explosions take place need to be cooled by a system of water or air circulation; third, as the mixture of gasoline vapor and air is ignited by an electric spark the whole arrangement of magneto or generator, battery, induction coil, and spark-timing device is termed the electric ignition system, with which is usually combined a complete electric lighting and motor-starting system; fourth, a more or less complicated system for supplying lubricating oil to engine bearings and cylinders. When the power has been produced on the crank-shaft of the engine it is transmitted through a friction clutch to a shaft conveying the power to the rear wheels; behind the clutch are the change speed gears—termed the transmission—which enables the wheels to be driven at varying speeds while the engine is running at a constant rate. Attached to the rear axle is a differential gear which enables either of the rear wheels to be turned independently of the other in rounding curves, and both to be driven at a uniform rate when the car is proceeding in a straight line. That part of the shaft lying between the transmission and the differential gear is provided with universal joints, which allow the rear wheels to rise and fall freely as the springs are compressed or released. The drive is usually direct from the shaft through bevel gears to shafts contained in the hollow rear axle. In addition to the engine with its auxiliary devices and the transmitting gears, other mechanical devices are in use, consisting of the brakes, the steering gear, the muffler, for deadening the sound of the explosions, air pumps and the various gauges—speed, air, oil, gasoline, temperature, etc., electric switches and the control devices for governing the speed and direction of movement. A fuller description of the essential parts of a gasoline automobile follows:

Motor. Gasoline motors are of two general types, two-cycle and four-cycle. The *two-cycle* motor consists essentially of

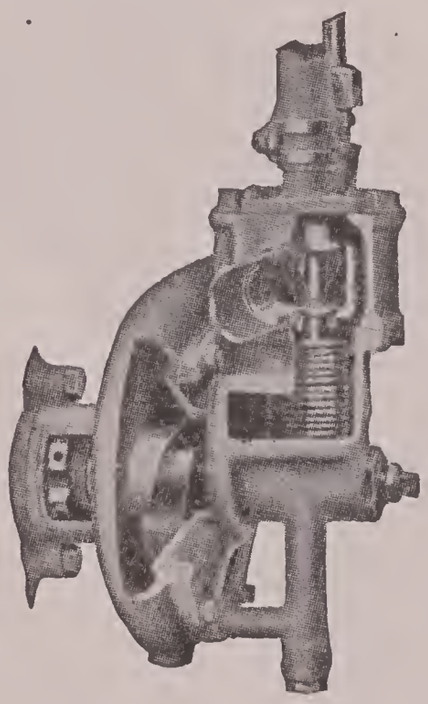
a cylinder with integral cylinder head, which is mounted on a base which contains the crank-shaft bearings and is just large enough to allow for the throw of the crank. This base must be gas tight. The cylinder is fitted with a hollow piston containing a wrist-pin and the piston drives the crank-shaft by means of a connecting-rod with crank and wrist-pin bearings. A carburetor, or other device for mixing gasoline and air in the proper proportions, is connected with the motor base. The cylinder wall contains two ports which are uncovered when the piston reaches its lowest point. One of these is the exhaust port through which the burned gases go to a muffler, the other an intake port connected with the base of the motor by a short length of pipe. The operation of this type of motor is as follows: With the revolution of the crank-shaft the piston rises to the top of the cylinder, creating a partial vacuum in the base which draws in a charge of gas; the piston then descends until the intake port is uncovered and gas rushes into the cylinder from the base, the charge being deflected away from the exhaust port by a baffle plate on the piston. The rise of the piston compresses the charge, which is fired by an electric spark at the top of the stroke, driving the piston down. Thus a power stroke is accomplished every other stroke of the piston or in two cycles. The *four-cycle* motor is similar in design except that the ports are replaced by mechanically operated valves located at the top of the cylinder. On the down stroke of the piston the inlet valve is opened by a cam on a shaft driven from the crank-shaft by chain or gears. At the end of the down stroke the inlet valve closes and the succeeding upstroke of the piston compresses the charge, which is fired at the top of the piston travel and descends on a power stroke. On the succeeding up stroke the exhaust valve is open and the cylinder cleansed of burned gases. Thus a cycle of four parts is accomplished, of which only one is a power stroke. On both types of motors a fly-wheel is necessary to carry the crank-shaft through the cycles between power strokes. While the two-cycle type of motor is apparently the more desirable, since it delivers an impulse from each cylinder for every revolution of the crank-shaft, the four-cycle type, which delivers an impulse on every second revolution, has proved the more efficient in practice and is almost universally adopted for automobile purposes. The first machines were equipped with one-cylinder engines, but the vibration increased so rapidly as increased power requirements were met, that more cylinders of smaller dimensions were added and thus two-



Section of 8-cylinder V-type motor showing valve rocker arm mechanism, water jackets and gas passages.

cylinder, four-cylinder, six-, eight- and finally twelve-cylinder cars appeared in the attempt to secure high power with a minimum vibration. Other methods of attaining the same end, such as careful balancing of moving parts and counterbalancing of the crank-shaft, have proved successful in large degree. Four-, six-, eight- and twelve-cylinder motors are all being produced by manufacturers of high-grade cars, the advantages of simplicity being claimed by makers of the four- and six-cylinder types, and of flexibility or wide range of driving speeds and smoother operation for the eight- and twelve-cylinder types.

Cooling. To carry off the heat generated by the repeated explosions in the cylinders a cooling system is necessary, the usual type being a water circulating system in which water is passed through a series of water jackets surrounding the cylinders by a centrifugal or gear pump. The hot water is piped from the top of the water jackets to a radiator consisting of a large number of thin tubes surrounded by radiating fins or of a tank pierced by many air tubes. Through the radiator, air is drawn by a fan driven by the engine. The cooled water is drawn from the bottom of the radiator by the pump and forced again through the water jackets. Another system, known as the 'thermo-syphon,' utilizes the principle that hot water rises, to secure circulation and so eliminates the pump. It has been found that an engine should operate at about 180° F. and various devices have been produced to regulate the temperature to this point. A modern device to automatically control the temperature of the water circulating around the cylinders is an expansion unit or thermostat, to which is attached two poppet valves so placed that they alternately open and close two ports. This unit is in a cylindrical case mounted back of the radiator upper inlet. When the engine is cold the unit is contracted so that the water in the radiator is forced through a by-pass directly down into the suction side of the pump. Thus no water circulates through the radiator and the water in the engine heats up rapidly. When the water becomes heated the unit expands, the by-pass chamber is automatically closed, the port leading into the radiator is opened and water flow into the radiator from the engine.



Centrifugal pump with thermostat attached.

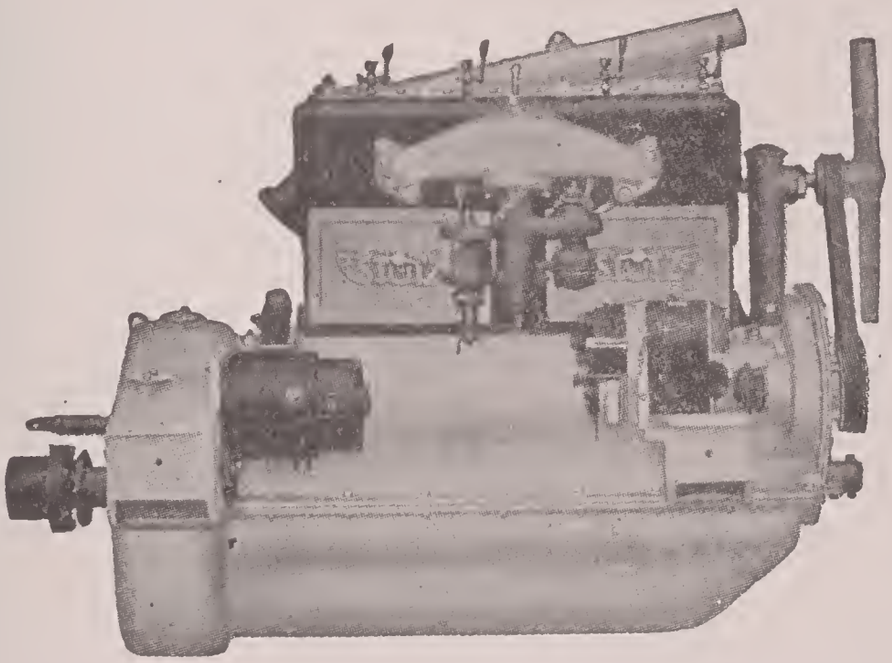
Air-cooling has been used with great success in certain makes of cars. In one of these air, drawn by a powerful fan in the flywheel back of the motor, passes into a chamber over the cylinders, thence through drums surrounding each cylinder and open at each end and out under the back of the car. Each cylinder is cast with a single wall, on the outside of which are a large number of radiating fins or pins, which rapidly conduct the heat away. The advantages of this system are that a considerable saving of weight is accomplished by eliminating the water, radiator, pump and piping. Furthermore, this system is simpler and free from the troubles of leaking, freezing and boiling which a water-cooling system is liable to.

Ignition. In the early days of the automobile the ignition was by three methods—the tube ignition, which was discarded on account of its inflexibility and the impossibility of controlling the ignition so effectually as by electric means; flame ignition, by means of which a flame continually burning was drawn at intervals into the combustion chamber to explode the mixture; and the catalytic method, which took advantage of the curious property possessed by spongy platinum of becoming red hot automatically in hydrogen. As with the tube and flame ignition this method has no flexibility such as is possessed by the electric method. There are two general types of electric ignition, make and break or low tension, and jump spark or high tension. In the first a spark is made within the cylinder by the opening and closing of two contact points, a complicated mechanical system which requires a shaft, cams, push-rods, springs and levers, that has been discarded in large degree. In the jump spark system, the spark is caused to jump between the points of a spark plug, a steel

tube inserted in the cylinder, through the center of which is a rod insulated by porcelain or mica from the tube. Attached to the lower end of the steel tube is a bent wire, which extends to within 1/32 of an inch of the exposed end of the central rod. A high tension current will jump this gap and fire the charge of gas in the cylinder. One electrode is connected to the central rod, the circuit being completed by using the motor itself as a conductor or ground. A source of high tension (or high voltage) electric current is necessary, which may be either a battery and induction coil with the necessary contact making and distributing devices to deliver current to each cylinder at the right instant, or a magneto. The magneto, now in wide use, is an electric generator in which the armature revolves in a magnetic field provided by permanent steel magnets. The armature in the case of the magneto machines is simply a shuttle-shaped piece of iron wound from end to end with a number of turns of cotton or silk-covered copper wire. This is mounted on a spindle running in bearings at either end of the system of magnets, and is caused to revolve at one-half engine speed in the magnetic field. The two ends of the wire wound on the armature are brought out to two collecting rings mounted on the spindle outside the bearings. Upon these collecting rings press brushes, to which wires are attached conveying the current to the spark timing and distributing apparatus. The armature is driven by means of gear wheels from the engine shaft, and as soon as the shaft of the engine is made to revolve by means of the starting handle, sparks are generated for igniting the charge at the correct moment.

The Eisemann system comprised a low tension generator and an induction-coil for producing a high-tension spark. It is, however, possible to wind the armature of the magneto with sufficiently fine wire to produce a high-tension current direct from the armature. This is done in the Bosch method, and thus the induction-coil is done away with.

The Delco high-tension type, adapted to an eight-cylinder engine, embodies the following elements: A source of current—the generator, or, at low speeds, the storage battery; an ignition timer, which interrupts the low tension current at the proper instant to produce a spark in the high tension circuit; an induction coil, transforming the primary current of six volts into one of sufficient voltage to jump between the points of the spark plugs; a condenser, which assists the induction coil to raise the voltage, and which protects the contact points of the ignition timer against burning; a high tension distributor, which directs the distribution of the high tension current to the spark plugs in the respective cylinders; a resistance unit, which protects the ignition coil and timer contacts from injury should the ignition circuit remain closed for any considerable length of time with the engine not running. Structurally, the ignition timer, the distributor, the condenser and the resist-



Modern four-cylinder 16-valve motor. Inlet side showing carburetor, magneto and electric starting motor.

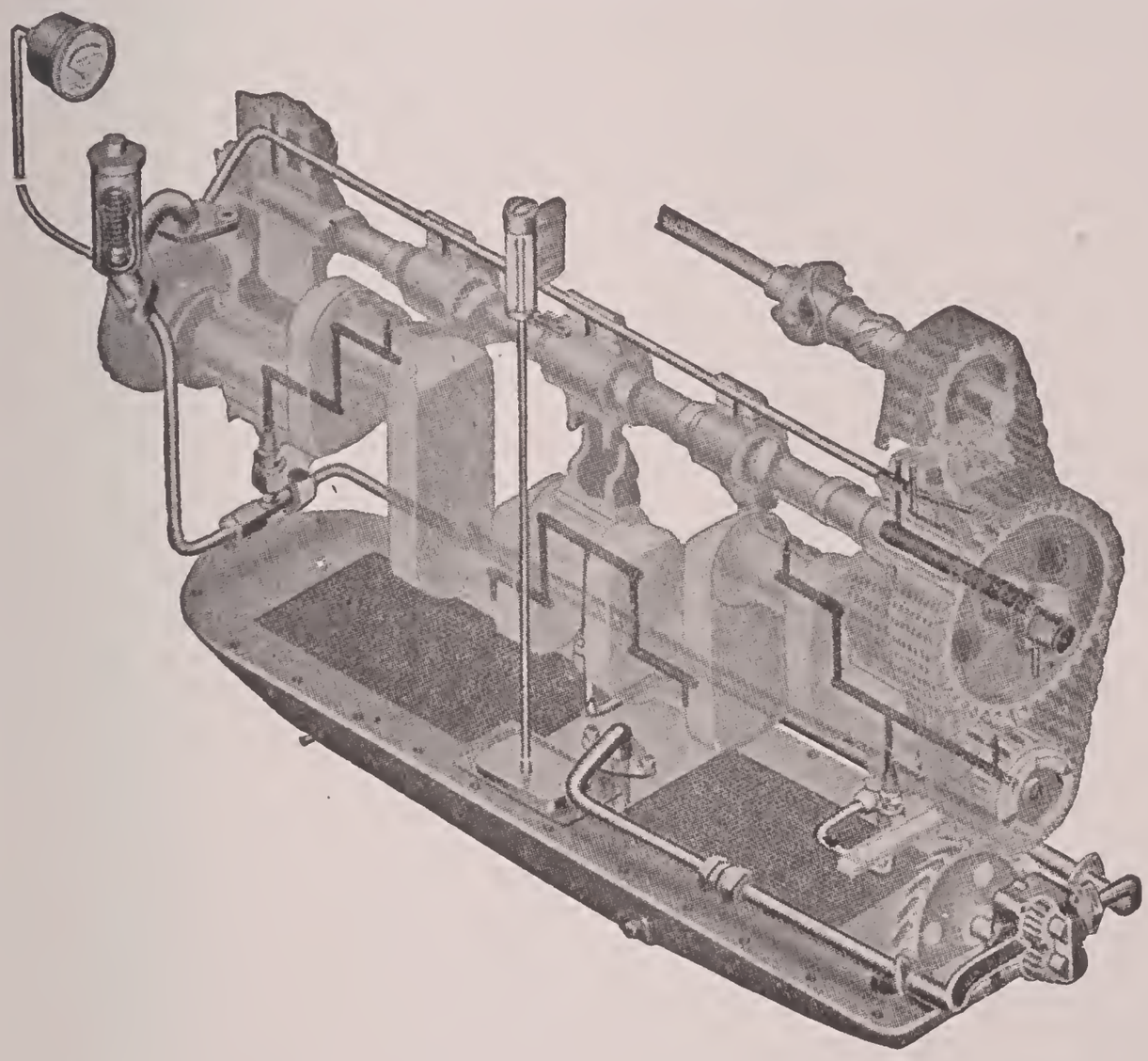
ance unit constitute a single assembly, which is bolted to the rear of the fanshaft housing. The ignition timer, which is driven by a vertical shaft through spiral gears from the fanshaft, has two sets of contact points. These share between them the current which would otherwise pass through one. The tendency to spark and corrode the points is ordinarily proportional to the amount of current passing through them. Thus, the use of two sets greatly adds to the life of each. The condenser, which is contained in a waterproof casing at the side of the distributor housing, further protects the contacts against the corrosive action of sparking, and utilizes the tendency to spark to intensify the transformer effect of the induction coil. The induction coil is carried under the cowl on the rear side of the dash. The primary current is interrupted by the timer contacts four times for each revolution of the engine, producing at each break of the primary current a high tension current, which is directed by the distributor to spark plugs in the respective cylinders. The distributor is located directly above the timer, and on the same shaft. It consists of a head or cap of insulating material, carrying one contact in the center, with eight additional contacts placed at equal distances from each other about the center. A rotor, locked to the shaft, maintains constant communication with the center contact, and carries a button which consecutively slides over the eight contacts in the gap.

Lubrication. Lubrication is of great importance in the smooth running of automobiles, and great progress has been made in schemes for supplying oil to the various bearings. A widely adopted method is the hollow crank-shaft through which oil is fed under pressure. A gear pump forces oil from the reservoir in the bottom of the motor through leads to each bearing. In each bearing is an inlet which registers with a hole in the bearing through which the oil is forced. The hollow crank-shaft is kept full of oil by the pressure. There is an outlet in each connecting rod bearing through which these bearings are lubricated. The piston-pin bushings receive lubrication by providing holes in the top to catch the oil spray thrown from the fast-revolving crankshaft. Other makers cling to the simple 'splash' system in which the oil is drawn from the reservoir and pumped into an oil pan into which the revolving cranks dip and splash the oil over the bearings and cylinder walls. A constant level is maintained in this pan by overflow pipes, which return the oil to the reservoir.

Carburetor. The early form of carburetor, for vaporizing the gasoline and mixing it with the air, was known as the surface carburetor. It consisted of a tank containing the gasoline and presenting a large surface to the air drawn through the tank when the engine was at work. The mere passage of the air across the surface of the volatile liquid saturated it to a sufficient degree, provided the gasoline was warm enough. The spray type succeeded this. It consists of two parts, the float chamber and the spray chamber. In its normal condition the float chamber is nearly full of gasoline and the float floating on the top. When in this position a small needle valve at the base of the chamber is closed and the passage of any further gasoline into the chamber is prevented. When the supply is used up the float sinks, presses against pivoted arms which, in turn, lift the needle valve; then a fresh supply of gasoline runs in, raising the float, and once again the needle valve is closed. The gasoline has free exit from the float chamber into the spray chamber, where a partial vacuum is created when the engine is making the suction stroke. A small quantity of gasoline is sucked through fine tubes in the form of spray, and at the same time a quantity of air is sucked up through the opening at the bottom; the air mixes with the gasoline vapor in the space above the spray maker, and the mixture passes away ready for use in the engine. A small swinging gate is provided at the air entrance, which, when the engine is working slowly, offers some obstruction to the admission of air; but when there is a large demand on the carburetor the air rushing in opens it wider and thus automatically regulates the supply of air to the required actual requirements of the engine. Above the top of the spray chamber is another series of openings for extra air; also there is provided a jacket around the spray chamber into which some of the hot exhaust gases from the exhaust pipe can be introduced. A little plunger is provided for the purpose of agitating the float when starting the engine. By pressing this two or three times a good supply of gasoline is ensured in the spray chamber. In the pipe leading from the carburetor to the engine is introduced a throttle valve, by means of which the quantity of mixture can be controlled. The same principle is applied to later carburetors, but the spray has given place to the single jet, and various other modifications have been introduced.

Transmission and Drive. Since an internal combustion motor is not self-starting in the exact sense, but must be turned by outside means to draw in the

first charge before it can run under its own power, a hand crank is supplied which can be attached to the end of the crank-shaft for this purpose. In modern cars this is supplemented by a small electric motor supplied with current by a storage battery. When the motor is running under its own power this starting motor is driven by it and acts as a dynamo and recharges the battery. An alternative is to supply a separate dynamo, in which case the starting motor runs only when the initial turning movement is to be given to the car motor. To make starting the car motor possible a friction clutch is required to free the motor from the driving wheels. This is of either cone or disc design and is either near or incorporated in the flywheel. The free end of this clutch is connected to the transmission, the function of this gearing being to allow of a variety of speeds between the motor and the rear wheels. The motor gives its highest power when running at or near its highest speed, 1500 to 3000 revolutions per minute. The transmission gearing enables the motor to run at its most efficient speed while driving the car at a moderate rate, thus allowing the driver to climb hills and pull through heavy roads that would not otherwise be possible. The usual practice is to provide cars with from two to four gear ratios as the weight of the car increases. In the planetary system the gears are controlled by foot pedals, but the usual type is the sliding gear transmission, in which the gears are controlled by a lever by which the desired gears can be slid into mesh. A reverse gear for running the car backwards is also provided. The rear axle varies widely in design, being either solid, live or floating. The *solid axle* is similar to a wagon axle and simply carries the weight of the car, the wheel drive being by chains from a transverse shaft



Pressure oil supply system with pressure gauge and regulator.

or spur gears engaging with large internal meshed gears mounted on the wheels themselves. The *live axle* consists of a tube which carries the weight, within which are two shafts, to the outer ends of which are keyed the wheels. At the inner ends the shafts are driven by differential gearing. The *floating axle* carries the weight of the car and also acts as a bearing for the wheels which are driven by internal shafts, at the outer ends of which are clutches engaging with the wheels.

Aluminum has entered more and more into the construction of automobiles, thus reducing weight. In some cars the structural part of the engine—including cylinder barrels, water jackets, bearing supports and the upper half of the crank case—is molded from aluminum in one piece. Touring bodies, fenders, hoods, radiator shells, parts of the rear axle and transmission case are further examples of the extent to which metallic aluminum now competes with the other sheet metals and with wood. The aluminum surface retains paint well, and the increased rigidity makes the car more durable.

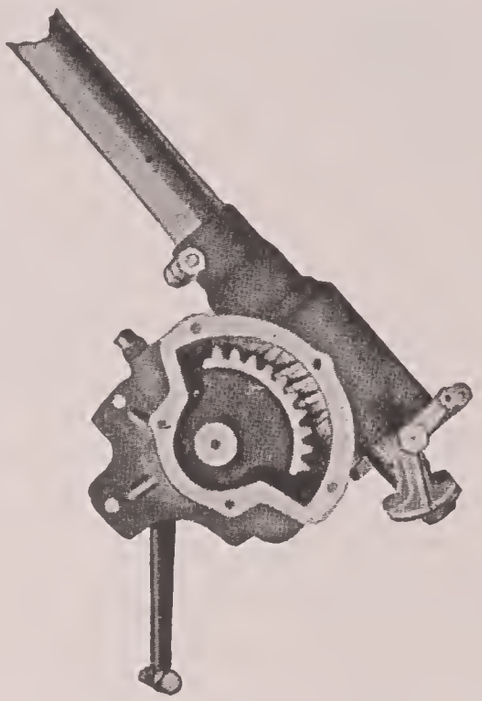
The Steam Car. Among the earliest American automobiles, steam-driven machines held a prominent place. Popular favor, however, soon turned to the gasoline car as the more economical in the use of fuel and less complicated in operation and because of the instantaneous starting feature of the internal explosion engine. Certain makers, however, clung to the steam-driven type and succeeded in developing a car which met most of the objections raised against the early steam machines. Economy was secured by substituting kerosene for gasoline as fuel; operation was made easy by substituting automatic for hand controls of the burner and water supply to the boiler; water, which is used lavishly in the production of steam, was conserved by adding a feed water heater and a condenser, which takes the place of a radiator in the gasoline car. The modern steam-driven car has a number of striking advantages over the gasoline car, as, for instance, the fact that considerable reserve power can be stored and applied in any desired volume to the rear wheels; its engine can develop its maximum power at the lowest speed and it is self-starting without the aid of auxiliary devices; no clutch, no flywheel, and no change speed gears are required and automatic controls render its operation exceedingly simple. Furthermore, it is claimed that the wide range of speeds without gear shifting, smooth starting and the continuous flow of power, lead to economy of tires and moving parts. In short, it is claimed that the steam car has attained, with a minimum of parts, all that the gasoline car is striving for by an increase of parts, such as additional cylinders, electric starting system, etc. The essentials of a steam car consist of a fire-tube boiler with burner and pilot light; a two-cylinder simple steam engine, geared directly to the rear axle through two spur gears; fuel and water tanks; air and water pumps; condenser and the various hand and automatic control devices. An electric generator with storage battery is added for lighting purposes. In operation water is fed to the boiler by pumps driven continuously from the rear axle, the amount admitted to the boiler being governed by an automatic valve with by-pass. This valve opens when the water level in the boiler sinks below a certain point and closes when the boiler is filled to the right level, opening the by-pass to allow the water to pump back to the supply tank. The boiler consists of a steel drum, through which run vertical tubes open at each end. Under this is the kerosene (or gasoline) burner, lighted by a pilot light, which burns continuously. The main burner is controlled by an automatic valve, which opens when the steam pressure falls below a fixed point. Fuel is forced to the burner by air pressure and the heat from the burner rising through the vertical tubes generates steam which (governed by a hand throttle located near the driver) passes to the engine. The exhaust steam goes to a feed water heater in the tank and thence to the condenser, where it turns into water again and is returned to the tank to be used over again. The driver controls the car by means of a hand throttle, a reverse lever and the usual brakes and steering gear.

The Electric Car. For city use, where runs are short and stops frequent, the electric car, because of its simplicity, cleanliness and ease of control, has become exceedingly popular. It consists essentially of a suitable frame and running gear, a storage battery with capacity for sixty to ninety miles operation on one charge, an electric motor or motors with suitable driving gears and a controller or rheostat and reversing switch. The speed of electric cars is usually limited to not more than twenty-five miles per hour. The battery is charged by connecting it with any suitable source of current and can easily be charged in a night for a full day's operation. Many systems of power transmission are used, the chief methods being either to gear motors to each rear wheel by spur gearing or to drive the rear

wheels by shafts contained in a hollow axle and connected through differential gearing with a motor either by chain or shaft and worm-gear drive.

Motor Trucks. In addition to the large number of machines designed to carry from two to seven passengers, which are still known as 'pleasure' cars, in spite of the general tendency to regard them as utilities and not luxuries, the automobile truck for freight and package delivery has come into wide use and is rapidly replacing the horse-drawn wagon as a more rapid and economical means of transportation. The fact that the motor truck can be kept in practically continuous operation at a speed two to five times greater than that of a horse-drawn wagon, enables it to do the work of from two to four teams. The earliest trucks were steam-driven, but gasoline and electric trucks practically monopolize the field at present. *Electric* trucks are used chiefly in the heart of cities, where the pavements are smooth and stops are frequent. The sizes run from ½-ton to 6 tons' capacity, with a battery capacity of from 40 to 75 miles on a single charge. The *gasoline* truck, which predominates on American roads, differs from the pleasure car in that it is built much more heavily and strongly to withstand the heavy strains to which it is subjected. These trucks are designed to run at low road speed and withstand severe service. Their capacity varies from ½-ton for light delivery purposes, to 7½ tons and upwards for handling heavy material, such as coal, sand, gravel, etc. The arrangement of the working parts of a truck is similar to that of a touring car. The engine and radiator are mounted at the forward end of a heavy frame. The engine is connected through a cone or disc clutch with the transmission gearing, which is usually placed close to the engine. The transmission gearing usually supplies three speeds forward and one reverse and this is connected by a shaft either to the rear axle, which is driven by bevel or worm gearing or the shaft drives a transverse shaft, located forward of the rear axle from which the wheels are driven by chains. The chain drive, however, is nearly obsolete and the worm drive is in almost universal use for trucks of large capacity.

In the light delivery car class, which is used by department stores, newspapers, etc., the chassis follows the lines of a pleasure car very closely and, in fact, many makers put out light delivery cars on the same chassis as their pleasure cars with a delivery car body. The general practice is to supply trucks with a ruggedly constructed four-cylinder engine of about 20 horsepower for the ½-ton truck, increasing to 45 to 50 horsepower as the 7½-ton size is reached. As the size of the truck increases, however, the maximum road speed is lowered, so that the larger truck seldom runs at a speed of more than 12 miles per hour. The wheel base varies from 100 to 200 inches, and while the tread of the light truck is



Irreversible worm and sector steering gear. The upper shaft extends to the steering wheel, lower arm to steering knuckles.

usually standard, in the larger sizes broad wheels with two tires on each wheel are often used to distribute the wear, and in this case the tread on the rear wheels is about six inches wider than on the front wheels. The wheels are usually of wood of an artillery type proportioned to the heavy load carried, but steel wheels, with a web or disc, instead of spokes, are being rapidly introduced. The weight of trucks varies from 1000 pounds in a light delivery car, to 7500 pounds and upwards for the 5-ton trucks and larger sizes. The style of body used on a truck varies widely with the use to which it is to be put. The usual open body with stake sides is adapted to general hauling, but special steel bodies with hydraulic dumping devices are used for hauling coal and similar materials. Tanks are built on truck chassis for carrying liquids and there are many other special uses to which the motor truck can be put.

Motor fire apparatus has come into wide use and in many motor fire-engines, the same engine which drives the car is

used to drive the pump. The great war in Europe demonstrated most strikingly the important part that trucks play in solving modern transportation problems. The immense supplies of food and ammunition, which had to be moved to the front, could not have been handled without the motor truck. In many cases, trucks have been used for the rapid transport of large bodies of men, which greatly increase the mobility of an army. During periods of railroad congestion the truck has been used to assist the railroads and regular truck services have been placed in operation between the large cities with a view to improving the transportation situation.

Motor vehicles were of invaluable service during the World War. The motor 'busses of London were commandeered for use as munition transports. Early in the war England established an automobile school under the direction of Major General W. G. B. Boyce, whose official title was Director of Transport of the British Armies in France.

The motor vehicles of Paris were rushed to the front when the moment came to strike back at the Germans in the early days of the war.

The coming of the automobile has given a new impetus to road building; it has made the country accessible to the city man and the city accessible to the country man; it has transformed life for 'the man with the hoe,' whose horizon was formerly bounded by the fences of his farm, or at best the narrow radius reached by horse and buggy. Now with the astonishingly cheap automobiles the farmer is brought into touch with men and women in cities and no longer lives to himself. In no country in the world is there such a wide distribution of cars as in America.

Autonomy (ạ-ton'o-mi) the power of a state to legislate for itself; used specifically of states which while exercising full control over domestic affairs are under the suzerainty of another power.

Autoplasty (ạ'to-plas-ti), the operation by which wounds and diseased parts are replaced by healthy tissue taken from the same body.

Autopsy (ạ'top-si), a post-mortem (after death) examination, or the inspection of a dead body, to ascertain the cause of death.

Autosuggestion (ạ'tō-sug-jes'chun), self-suggestion, the influence of the imagination upon the moral and physical well-being of mankind. The most famous exponent of autosuggestion is Dr. Emile Coué, French psychotherapeutist, whose book, *Self-Mastery Through Conscious Autosuggestion*, has had phenomenal sales in Europe and America. Dr. Coué insists that many ailments are nothing but the result of unconscious autosuggestion, and the cure lies in conscious autosuggestion. His formula for the practice of conscious autosuggestion is as follows: 'Every morning before getting up, and every evening as soon as you are in bed, repeat 20 times the phrase, "Day by day, in every way, I am getting better and better."' Consult also *Suggestion and Autosuggestion*, by C. Baudoin; *Rational Education of the Will*, by P. E. Levy; *The Practice of Suggestive Therapeutics*, by Ernest Weltmer; *The Healing Hand*, by Sidney A. Weltmer, etc.

Autumn (ạ'tum) the season between summer and winter, in America regarded as embracing September, October, and November. The beginning of the astronomical autumn is September 22, the autumnal equinox; and the end is December 21, the shortest day. The autumn of the southern hemisphere takes place at the time of the northern spring. In England, autumn is generally considered as embracing August, September, and October.

Autun (ō-tuṇ; Lat. *Augustodunum*), a city, Southeastern France, department of Saône-et-Loire. It has two Roman gates of exquisite workmanship, the ruins of an amphitheater and of several temples, the cathedral of St. Lazare, a fine Gothic structure of the eleventh century, manufactures of carpets, woolens, cotton, velvet, hosiery, etc. Pop. 15,498.

Auvergne (ō-vār-nyė), a province of Central France, now merged into the departments Cantal and Puy-de-Dôme, and part of the department of Haute-Loire. The Auvergne Mountains, separating the basins of the Allier, Cher, and Creuse from those of the Lot and Dordogne, contain the highest points of Central France; Mont Dore, 6188 feet; Cantal, 6093 feet, and Puy-de-Dôme, 4806 feet. The number of extinct volcanoes and general geological formation make the district one of great scientific interest. The minerals include iron, coal, copper, and lead, and there are warm and cold mineral springs.

Auxerre (ō-sār), a town of France, department of Yonne, 90 miles S. E. of Paris. Principal edifices: a fine Gothic cathedral, unfinished; the abbey of St. Germain, with curious crypts; and an old episcopal palace, now the Hôtel de Préfecture; it manufactures woolens, hats, casks, leather, earthenware, violin strings, etc., trade, chiefly in wood and wines. Pop. 21,929.

AMERICAN TREE LEAVES, FLOWERS AND FRUITS

1. Black oak. 2. White ash (seven leaflets more common than 5). 3. White oak. 4. White elm. 5. Magnolia. 6. Tulip tree. 7. Sycamore or Buttonwood. 8. White, or Silver maple. 9. Red cedar. 10. Sweet or Red gum.

Auxometer (ąks-om'e-tėr), an instrument to measure the magnifying powers of an optical apparatus.

Auxonne (ō-son; anc. *Aussona*), a town of France, department of Côte-d'Or (Burgundy), on the Saône; a fortified place, with some manufactures. Pop. (1906) 2766.

Ava (ä'vå), a town in Asia, formerly the capital of Burmah, on the Irrawady, now almost wholly in ruins.

Ava-Ava, ARVA, KAVA, or YAVA (*Macropiper methysticum*), a plant of the nat. order Piperaceæ (pepper family), so called by the inhabitants of Polynesia, who make an intoxicating drink out of it. Its leaves are chewed with betel in Southeastern Asia. It is diuretic and anæsthetic.

Avalanche (av'a-lansh), a large mass of snow or ice precipitated from the mountains. There are distinctions of *wind* or *dust* avalanches, when they consist of fresh-fallen snow whirled like a dust storm into the valleys; *sliding avalanches*, when they consist of great masses of snow sliding down a slope by their own weight; and *glacier* or *summer avalanches*, when ice-masses are detached by heat from the high glaciers. Also applied to masses of earth and rock sliding down mountains.

Aval Islands. Same as *Bahrein Islands.*

Avallon (å-vå-lōn), a town of Central France, dep. Yonne. Pop. (1906) 5197.

Avalon (av'a-lon), a sort of fairyland or elysium mentioned in connection with the legends of King Arthur, being his abode after disappearing from the haunts of men; called also *Avilion.* The name is also identified with Glastonbury; and has been given to a peninsula of Newfoundland.

Avalon, a residential borough of Allegheny Co., Pennsylvania, on the Ohio River, a few miles N. W. of Pittsburgh. Pop. (1920) 5277.

Avars (av'ars), a nation, probably of Turanian origin, who at an early period may have migrated from the region east of the Tobol in Siberia to that about the Don, the Caspian Sea, and the Volga. They became active in Europe in 555 A.D. when a party of them advanced to the Danube and settled in Dacia. They served in Justinian's army, aided the Lombards in destroying the kingdom of the Gepidæ, and in the sixth century conquered under their khan Bajan the region of Pannonia. They then won Dalmatia, pressed into Thuringia and Italy against the Franks and Lombards, and subdued the Slavs dwelling on the Danube, as well as the Bulgarians on the Black Sea. But they were ultimately limited to Pannonia, where they were overcome by Charlemagne, and nearly extirpated by the Slavs of Moravia. After 827 they disappear from history. Traces of their fortified settlements are found, and known as Avarian rings.

Avatar (av-a-tår'), more properly AVATARA, in Hindu mythology, an incarnation of the Deity. Of the innumerable avatars the chief are the ten incarnations of Vishnu, who appeared successively as a fish, a tortoise, a boar, etc.

Avatcha (å-vatsh'å), a volcano and bay in Kamchatka The volcano, which is 9000 ft. high, was last active in 1855. The town of Petropavlovsk lies on the bay.

Aveiro (å-vā'i-rų), a coast town in Portugal, province of Beira, with a cathedral, an active fishery, and a thriving trade. Pop. 10,012.

Avellino (ä-vel-lē'nō), a town in southern Italy, capital of the province of Avellino, 29 m. east of Naples, the seat of a bishop. Avellino nuts were celebrated under the Romans. Pop. 23,760. Area of the prov. 1409; pop. 421,766.

Ave Maria (ā've, or ā've mà-rē'à; 'Hail, Mary'), the first two words of the angel Gabriel's salutation (Luke i, 28), and the beginning of the very common Latin prayer to the Virgin in the Roman Catholic Church. It consists of three parts, namely, the words the angel addressed to Mary when he announced to her the Incarnation, those with which Elizabeth saluted her, and those of the Church to implore her intercession. In the devotion of the Rosary, each decade consisting of one Pater and ten Aves, the latter are counted upon the small beads.

Avena (a-vē'na), the oat genus of plants. See *Oat.*

Avens, a European plant, of the genus *Geum.* Common avens, or herb-bennet, *G. urbānum*, possesses astringent properties. The American species, *G. rivale*, has the same properties; it is a fine plant.

Aventaile (av'en-tāl), the movable face-guard of the helmet, through which the warrior breathed.

Aventurine (a-ven'tūr-īn). See *Avanturine.*

Average (av'er-āj), in maritime law, any charge or expense over and above the freight of goods, and payable by their owner.—*General average* is the sum falling to be paid by the owners of ship, cargo, and freight, in proportion to their several interests, to make good

any loss or expense intentionally incurred for the general safety of ship and cargo; *e.g.*, throwing goods overboard, cutting away masts, port dues in cases of distress, etc.—*Particular average* is the sum falling to be paid for unavoidable loss when the general safety is not in question, and therefore chargeable on the individual owner of the property lost. A policy of insurance generally covers both general and particular averages, unless specially excepted.

Avernus (a-ver'nus), a lake, now called *Lago d'Averno*, in Campania, Italy, between the ancient Cumæ and Puteoli, about 8 m. from Naples. It occupies the crater of an old volcano, and is in some places 180 feet deep. Formerly the gloom of its forest surroundings and its mephitic exhalations caused it to be regarded as the entrance to the infernal regions. It was the fabled abode of the Cimmerians, and especially dedicated to Proserpine.

Averroes (a-ver'o-ez; corrupted from *Ibn Roshd*), the most renowned Arabian philosopher, born at Cordova, in Spain, probably between 1120 and 1149. His ability procured him the succession to his father's office of chief magistrate, and the King of Morocco appointed him at the same time cadi in the province of Mauretania. Accused of being an infidel, he was, however, deprived of his offices, and banished to Spain; but, being persecuted there also, he fled to Fez, where he was condemned to recant and undergo public penance. Upon this he went back to his own country, where the Caliph Almansur finally restored him to his dignities. He died at Morocco, the year of his death being variously given as 1198, 1206, 1217, and 1225. Averroes regarded Aristotle as the greatest of all philosophers, and devoted himself so largely to the exposition of his works as to be called among the Arabians *The Interpreter*. He wrote a compendium of medicine, and treatises in theology, philosophy, jurisprudence, etc. His commentaries upon Aristotle appeared before 1250 in a Latin translation attributed to Michael Scott and others.

Averruncator (av-er-ung-kā'tėr), a garden implement for pruning trees without a ladder, consisting of two blades similar to stout shears, one fixed rigidly to a long handle, and the other moved by a lever to which a cord passing over a pulley is attached.

Aversa (a-vėr'sa), a well-built town of Southern Italy, 7 miles N. of Naples, in a beautiful vine and orange district, the seat of a bishop, with a cathedral and various religious institutions, and an excellently-conducted lunatic asylum. Andreas of Hungary, husband of Queen Johanna I, was strangled in a convent here, Sept. 18, 1345. Pop. 23,477.

Avesnes (à-vān), a town of France, dep. Nord. Pop. (1906) 5076.

Avesta (a-ves'ta). See *Zendavesta*.

Aveyron (à-vā-rōn), a department occupying the southern extremity of the central plateau of France, traversed by mountains belonging to the Cevennes and the Cantal ranges; principal rivers: Aveyron, Lot, and Tarn, the Lot alone being navigable. The climate is cold, and agriculture is in a backward state, but considerable attention is paid to sheep-breeding. It is noted for its 'Roquefort cheese.' It has important coal, iron, and copper mines, besides other minerals. Area, 3340 sq. miles; capital, Rhodez. Pop (1906) 377,299.

Avezzano (a-vet-zä'nō), a town of S. Italy, prov. Aquila. Pop. 8400.

Aviary (ā'vi-a-ri), a building or inclosure for keeping, breeding, and rearing birds. Aviaries appear to have been used by the Persians, Greeks, and Romans, and are highly prized in China. In England they were in use at least as early as 1577, when William Harrison refers to 'our costlie and curious aviaries.'

Aviation (ā'vi-a-shun), the problem of flight as practised by birds and men. See *Aëroplane*.

Avicenna (a-vi-sen'na) or IBN-SINA, an Arabian philosopher and physician, was born in Bokhara, A.D. 980. After practising as a physician he quitted Bokhara at the age of 22, and for a number of years led a wandering life, settling at last at Hamadan, latterly as vizier of the emir. On the death of his patron he lived in retirement at Hamadan, but having secretly offered his services to the Sultan of Ispahan, he was imprisoned by the new emir. Escaping, he fled to Ispahan, was received with great honor by the sultan, and passed there in quietness the last fourteen years of his life, writing upon medicine, logic, metaphysics, astronomy, and geometry. He died in 1037, leaving many writings, mostly commentaries on Aristotle. Of his 100 treatises the best known is the *Canon Medicinæ*, which was still in use as a text-book at Louvain and Montpellier in the middle of the seventeenth century.

Avienus (av-i-ē-nus), RUFUS FESTUS a Latin descriptive poet

who flourished about the end of the fourth century, after Christ, and wrote *Descriptio Orbis Terræ*, a general description of the earth; *Ora Maritima*, an account of the Mediterranean coasts, etc.

Avifauna (av-i-fą'na), a collective term for the birds of any region.

Avigliano (à-vēl-yä'nō), a town of S. Italy, prov. Potenza. Pop. 12,570.

Avignon (à-vē-nyōn; ancient, *Avenio*), an old town of S. E. France, capital of department Vaucluse, on the left bank of the Rhone; inclosed by lofty battlemented and turreted walls, well built, but with rather narrow streets. It is an archbishop's see, and has a large and ancient cathedral on a rock overlooking the town, the immense palace in which the popes resided (now the property of the municipality). The industries of the city are numerous and varied, the principal being connected with silk. The silk manufacture and the rearing of silkworms are the principal employments in the district. Here Petrarch lived several years, and made the acquaintance of Laura, whose tomb is in the Franciscan church. From 1309 to 1376 seven popes in succession, from Clement V to Gregory XI, resided in this city. After its purchase by Pope Clement VI in 1348 Avignon and its district continued, with a few interruptions, under the rule of a vice-legate of the pope till 1791, when it was formally united to the French Republic. Pop. 49,304.

Avignon Berries. See *French Berries.*

Avila (ä'vē-lä), a town of Spain, capital of province of Avila, a modern division of Old Castile. See of the bishop suffragan of Santiago, with fine cathedral. Once one of the richest towns of Spain. Principal employment in the town, spinning; in the province, breeding sheep and cattle. Pop., town, 11,885; province, 200,457.

Avila, GIL GONZALEZ DE, a Spanish antiquary and biographer, 1577–1658; made historiographer of Castile in 1612, and of the Indies in 1641. Most valuable works: *Teatro de las Grandezas de Madrid*, 1623, and *Teatro Ecclesiastico*, 1645–53.

Avila y Zuniga (ä'vē-lå ē thö-nyē'gå), DON LUIS DE, Spanish general, diplomatist, and historian; a favorite of Charles V; born about 1490; died after 1552. His chief work, translated into five or six languages, was on the war of Charles V in Germany.

Aviles (ä-vē'les), a town of Northern Spain, prov. Oviedo, with a good harbor. Pop. 12,763.

Aviz, an order of knighthood in Portugal, instituted by Sancho, its first king, and having as its original object the subjection of the Moors.

Avlona (åv-lō'nà), a seaport in Albania, seat of government of the principality. It was occupied by Italian forces during the European war (*q. v.*). Also called Valona. Pop. 6500.

Avocado (av-ō-ka'dō) pear. See *Alligator-pear.*

Avogadro's (åv-ō-ga'drō) LAW, in physics, asserts that equal volumes of different gases at the same pressure and temperature contain an equal number of molecules.

Avoirdupois (a,vur-dū-poiz'; from old French, lit. 'goods of weight'), a system of weights used for all goods except precious metals, gems, and medicines, and in which a pound contains 16 ounces, or 7000 grains, while a pound troy contains 12 ounces, or 5760 grains. A hundredweight contains 112 pounds avoirdupois; a *cental* of 100 pounds is a legal British weight used at Liverpool and elsewhere in commerce.

Avola (åv'o-là), a seaport on the east of Sicily, with a trade in almonds, sugar, etc. Pop. 16,235.

Avon (ā'von), the name of several rivers in England, of which the principal are: (1) The Upper Avon, rising in Northamptonshire, flowing S.W. into the Severn at Tewkesbury. Stratford-on-Avon lies on this river; (2) The Lower Avon, rising in Gloucestershire, and falling into the Severn N. W. of Bristol; navigable as far as Bath; (3) In Monmouthshire; (4) In Wiltshire and Hampshire, entering the English Channel at Christchurch Bay. There are also streams of this name in Wales and Scotland.

Avoset (av'ō-set), a bird about the size of a lapwing, of the genus *Recurvirostra* (*R. avosetta*), family Scolopacidæ (snipes), order Grallatores. The bill is long, slender, elastic, and bent upward toward the tip, the legs long, the feet webbed, and the plumage variegated with black and white. The bird feeds on worms and other small animals, which it scoops up from the mud of the marshes and fens that it frequents. It is found in Europe, Asia, Africa, and America; but the American species is slightly different from the other.

Avranches (å-vränsh; *Abrincatæ*), a town of ancient France, department Manche, about 3 miles from the Atlantic. It formerly had a fine cathedral. Manufactures: lace, thread, and candles. Pop. (1906) 7186.

Awe (ą), a Scottish lake in Argyleshire, about 28 miles long by 2 broad, and communicating by the river Awe with Loch Etive. Ben Cruachan stands at its northern extremity. It has many islands and beautiful scenery, and abounds in trout, salmon, etc.

Axe, or Ax, a well-known tool for cutting or chipping wood, consisting of an iron head with an arched cutting edge of steel, which is in line with the wooden handle of the tool, and not at right angles to it as in the adze.

Axel. See *Absalon.*

Axe-stone, a mineral, a variety of nephrite or jade, used by the natives of New Zealand and South Pacific Islands for axes, etc. See *Jade.*

Axholme Isle (aks'ōm), a sort of island in England formed by the rivers Trent, Idle, and Don, in the northwest angle of Lincolnshire, 17 miles long, 4½ broad.

Axil, AXILLA (aks'il, aks-il'a), in botany, the angle between the upper side of a leaf and the stem or branch from which it springs. Buds usually appear in the axils, and flowers or flower-stalks growing in this way are called *axillary.*

Axillia, the space between the humerus and the chest below the shoulder joint, containing arteries, veins, brachial plexus of nerves and lymphatic glands. Outside the skin the surface is called the armpit.

Ax'im, a town of W. Africa, on the Gold Coast.

Axinite (aks'i-nīt), a mineral, a silicate of alumina, lime, etc., with boron trioxide, deriving its name from the form of the crystals, the edges of which bear some resemblance to the edge of an axe.

Axinomancy (aks-in'o-man-si), an ancient method of divination by the movements of an axe (Gr. *axinē*) balanced on a stake, or of an agate placed on a red-hot axe. The names of suspected persons being uttered, the movements at a particular name indicated the criminal.

Axiom (aks'i-om), a universal proposition which the understanding must perceive to be true as soon as it perceives the meaning of the words, and therefore called a *self-evident truth: e. g., A is A.* In mathematics axioms are those propositions which are assumed without proof, as being in themselves independent of proof, and which are made the basis of all the subsequent reasoning; as, 'The whole is greater than its part'; 'Things that are equal to the same thing are equal to one another.'

Axis (aks'is), the straight line real or imaginary, passing through a body or magnitude, on which it revolves, or may be supposed to revolve; especially a straight line with regard to which the different parts of a magnitude, or several magnitudes, are symmetrically arranged; *e. g.,* the *axis of the earth,* the imaginary line drawn through its two poles.

In botany the word is also used, the stem being termed the *ascending axis,* the root the *descending axis.*

In anatomy the name is given to the second vertebra from the head, that on which the *atlas* moves. See *Atlas.*

Axis (*Cervus axis*), a species of Indian deer, also known as the Spotted Hog-deer, of a rich fawn color, nearly black along the back, with white spots, and under parts white. Breeds freely in many parks in Europe.

Axis, Cerebro-spinal. The brain and spinal cord or central nervous system.

Axminster (aks'mins-tėr), a market town, England, county Devon, on the Axe, at one time celebrated for its woolen cloth and carpet manufactures, and giving name to an expensive variety of carpet having a thick, soft pile, and also to a cheaper variety. Pop. (1911) 12,343.

Axolotl (aks'ō-lotl; *Amblystŏma maculātum*), a curious Mexican amphibian, not unlike a newt, from 8 to 10 inches in length, with gills formed of three long ramified or branchlike processes floating on each side of the neck. It reproduces by laying eggs, and was for some time regarded as a perfect animal with permanent gills. It is said, however, that it frequently loses its gills like the other members of the genus, though some authorities maintain that the true axolotl never loses its gills, and that merely confusion with *A. tigrīnum* has led to the belief, as this species sometimes retains its branchiæ, though usually it loses them. The axolotl is esteemed a luxury by the Mexicans. There are a number of species of Amblystoma in N. America.

Ax'um, a town in Tigré, a division of Abyssinia, once the capital of an important kingdom, and at one time the great depot of the ivory trade in the Red Sea. The site of the town still exhibits many remains of its former greatness; but modern Axum is only a miserable village.

Ayacucho (ä-yä-kö'chō), the name of a department of Peru, and of its capital. The dept. has an area of

18,185 sq. miles. The town (formerly Guamanga or Huamanga) has a cathedral and a university, and a pop. of about 20,000.

Ayala (á-yä'lá), Pedro Lopez de, Spanish historian and poet, chancellor of Castile in the second half of the fourteenth century, and the author of a history of Castile during 1350–96. He took an active part in the struggle between Henry II and Pedro the Cruel, and was taken prisoner by the English in 1367. During his English captivity he wrote part of his chief poetical work, a *Book in Rhyme concerning Court Life*. Died, 1407.

Ayamonte (ī-á-mon'tā), a seaport town of Spain, province of Huelva, 2 miles from the mouth of the Guadiana. Pop. 7530.

Ayasaluk (á-yas'a-luk), the modern representative of ancient Ephesus.

Aye-aye (ī-ī), an animal of Madagascar (*Chirōmys Madagascariensis*), so called from its cry, now referred to the lemur family. It is about the size of a hare, has large, flat ears and a bushy tail, large eyes; long, sprawling fingers, the third so slender as to appear shriveled, and used to pull larvæ from crevices in trees; color, musk-brown mixed with black and gray ash; feeds on grubs, fruits, etc., habits, nocturnal.

Ayesha (a-yesh'a), daughter of Abu-Bekr and favorite wife of Mohammed, the Arabian prophet, though she bore him no child; born in 610 or 611. After his death she opposed the succession of Ali, but was defeated and taken prisoner. She died at Medina in 677 or 678 (A.H. 58).

Aylesbury (ālz'be-ri), county town of Buckinghamshire, England, with a fine old parish church; chief industries, silk-throwing, printing, making condensed milk, and poultry-rearing for the London market. Previous to 1885 it and its hundred sent two members to parliament, and it still gives name to a parliamentary division. Pop. 11,048.

Ayloffe (ā'lof), Sir Joseph, an English antiquary, born about 1708, died 1781; one of the first council of the Society of Antiquaries, a commissioner for the preservation of state papers, and author and editor of several works, of which the best known is his *Calendars of the Auntient Charters*, etc.

Aymaras (ī'mȧ-rȧz), an Indian race of Bolivia and Peru, speaking a language akin to the Quichua.

Aymon (ā'mon), the surname of four brothers, Alard, Richard, Guiscard, and Renaud, who hold a first place among the heroes of the Charlemagne cycle of romance. Their exploits were the subject of a romance, *Les Quatre Fils d'Aymon*, by Huon de Villeneuve, a trouvère of the thirteenth century, and Renaud is a leading figure in Ariosto's *Orlando*.

Ayr (ār), a town of Scotland, capital of Ayrshire, at the mouth of the river Ayr, near the Firth of Clyde. It was the site of a Roman station. William the Lion built a castle here in 1197 and constituted it a royal burgh in 1202; and the parliament which confirmed Edward Bruce's title to the crown sat in Ayr. It is picturesquely situated, and ranks among the better class of provincial towns, being chiefly of interest as the center of the 'Burns country.' One of its celebrated bridges, opened in 1879, occupies the place of the 'New Brig' of Burns's *Brigs of Ayr*, the 'Auld Brig' (built 1252) being still serviceable for foot traffic. Carpets and lace curtains are manufactured. The harbor accommodation is good, and there is a considerable shipping trade, especially in coal. The house in which Burns was born stands within 1½ miles of the town, between it and the church of Alloway ('Alloway's auld haunted kirk'), and a monument to him stands on a height between the kirk and the bridge over the Doon. Pop. 28,624.—The county has a length along the Firth of Clyde and North Channel of 80 miles; area 1128 sq. miles. The surface is irregular, and a large portion of it hilly, but much of it is fertile. The principal streams are the Ayr, Stinchar, Girvan, Doon, Irvine, and Garnock. Coal and iron are abundant; and there are numerous collieries and ironworks. Limestone and freestone abound. The Ayrshire cows are celebrated as milkers, and the Dunlop cheese has a good reputation. Oats, turnips, and potatoes are grown and dairying is a large industry. Carpets, bonnets, and worsted shawls are made, and Ayrshire needlework and wooden snuff-boxes and similar articles are much esteemed. Chief towns, Ayr, Kilmarnock, and Irvine. Pop. 254,400.

Ayrer (ī'rer), Jacob, a German dramatist of the sixteenth century, who almost rivalled Hans Sachs in copiousness and importance. He was a citizen and legal official of Nuremberg, and died in 1605. His works, published at Nuremberg in 1618, under the title *Opus Theatricum*, include thirty comedies and tragedies and thirty-six humorous pieces.

Aytoun (ā'tun), Sir Robert, poet, born in Fifeshire, Scotland, 1570, died 1638. After studying at St.

Andrews he lived for some time in France, whence, in 1603, he addressed a panegyric in Latin verse to King James on his accession to the crown of England. By the grateful monarch he was appointed one of the gentlemen of the bed-chamber, and private secretary to the queen, receiving also the honor of knighthood. At a later period of his life he was secretary to Henrietta Maria, queen of Charles I. His poems are few in number, but are distinguished by elegance of diction. Several of his Latin poems are preserved in the work called *Deliciæ Poetarum Scotorum.*

Aytoun, WILLIAM EDMONSTOUNE, poet and prose writer, born at Edinburgh in 1813; died at Blackhills, Elgin, 1865. He issued a volume of poems in 1832, by 1836 was a contributor to *Blackwood's Magazine*, and published the *Life and Times of Richard I* in 1840. In 1848 he published a collection of ballads entitled *Lays of the Scottish Cavaliers*, which has proved the most popular of all his works. It was followed in 1854 by *Firmilian, a Spasmodic Tragedy* (intended to ridicule certain popular writers); the *Bon Gaultier Ballads* (parodies and other humorous pieces, in conjunction with Theodore Martin), 1855; in 1856 the poem *Bothwell;* and in subsequent years by *Norman Sinclair, The Glenmutchkin Railway*, and other stories. In 1858 he edited a critical and annotated collection of the *Ballads of Scotland.* A translation of the poems and ballads of Goethe was executed by him in conjunction with Theodore Martin. In 1845 he became professor of rhetoric and English literature in the University of Edinburgh—a position which he held till his death.

Ayuntamiento (å-yụn-tå-mē-en′tō), the name given to the town and village councils in Spain and Spanish America.

Ayuthia (a-yū′thē-a), the ancient capital of Siam, on the Menam, now a scene of splendid ruin.

Azalea (a-zā′lē-a), a genus of plants, natural order Ericaceæ, or heaths, remarkable for the beauty and fragrance of their flowers, and distinguished from the rhododendrons chiefly by the flowers having five stamens instead of ten. Many beautiful rhododendrons with deciduous leaves are known under the name of *azalea* in gardens. The azaleas are common in North America, and two species of these—*A. viscōsa* and *A. nudiflōra*—are well known in Britain. An Asiatic species, *A. pontica*, famous for the stupefying effect which its honey is said to have produced on Xenophon's army, is also common in British gardens and shrubberies; and another, *A. indica*, is a brilliant greenhouse plant.

Azalea (*Azalea indica*).

Azamgarh (az′am-gar), a town of India, N. W. Provinces, capital of dist. of same name. Pop. about 20,000. The district has an area of 2147 sq. miles.

Azeglio (åd-zel′yō), MASSIMO TAPARELLI, MARQUIS D', an Italian 'admirable Crichton,' artist, novelist, publicist, statesman, and soldier, born at Turin in 1798, died 1866. After gaining some reputation in Rome as a painter, he married the daughter of Manzoni, and achieved success in literature by his novels *Ettore Fieramosca* (1833) and *Niccolo dei Lapi* (1841). These embodied much of the patriotic spirit, and in a short time he devoted himself exclusively to fostering the national sentiment by personal action and by his writings. Many of the reforms of Pius IX were due to him. He commanded a legion in the Italian struggle of 1848, and was severely wounded at Vicenza. Chosen a member of the Sardinian Chamber of Deputies, he was, after the battle of Novara, made president of the cabinet, and in 1859 appointed to the military post of general and commissioner-extraordinary for the Roman States.

Azerbijan (å-zer-bī-jän′), a province of Northwestern Persia; area estimated at from 30,000 to 40,000 sq. miles; pop. estimated at about 1,500,000. It consists generally of lofty mountain ranges, some of which rise to a height of between 12,000 and 13,000 feet. Principal rivers; the Aras or Araxes, and the Kizil-Uzen, which enter the Caspian; smaller streams discharge themselves within the province into the great salt lake of Urumiyah. Agricultural products; wheat, barley, maize, fruit, cotton, tobacco, and grapes. Horses, cattle, sheep, and camels are reared in considerable numbers. Chief minerals: iron,

lead, copper, salt, saltpeter, and marble. Tabreez is the capital.

Azimgurh (az′im-gur). See *Azamgarh.*

Azimuth (az′i-muth), of a heavenly body, the arc of the horizon comprehended between the meridian of the observer and a vertical circle passing through the center of the body. The azimuth and altitude give the exact position of the body.

Azincourt (a-zaṇ-kūr). Same as *Agincourt.*

Azof (a′zof), a town in the Russian government of Ekaterinoslav, upon an island at the mouth of the Don, where it flows into the Sea of Azof; formerly a place of extensive trade, but its harbor has become almost sanded up. Pop. 27,000.

Azof, Sea of (anc. *Palus Mœōtis*), an arm of the Black Sea, with which it is united by the Straits of Kertch or Kaffa; length about 170, breadth about 80 miles; greatest depth not more than 8 fathoms. The W. part, called the Putrid Sea, is separated from the main expanse by a long, sandy belt called Arabat, along which runs a military road. The sea teems with fish. The Don and other rivers enter it, and its waters are very fresh.

Azoic (a-zō′ik), 'without life,' a term applied to rocks devoid of fossils.

Azores (à-zōrz′ or à-zō′res), or Western Islands, a group belonging to and 900 miles west of Portugal, in the North Atlantic Ocean. They are nine in number, and form three distinct groups—a N. W., consisting of Flores and Corvo; a central, consisting of Terceira, São Jorge, Pico, Fayal, and Graciosa; and a S. E., consisting of São Miguel (or St. Michael) and Santa Maria. The total area is about 900 sq. miles; São Miguel (containing the capital Ponta Delgada), Pico and Terceira are the largest. The islands, which are volcanic and subject to earthquakes, are apparently of comparatively recent origin, and are conical, lofty, precipitous, and picturesque. The most remarkable summit is the peak of Pico, about 7600 feet high. There are numerous hot springs. They are covered with luxuriant vegetation, and diversified with woods, cornfields, vineyards, lemon and orange groves, and rich open pastures. The mild and somewhat humid climate, combined with the natural fertility of the soil, brings all kinds of vegetable products rapidly to perfection, among the most important being grain, oranges, pineapples, bananas, potatoes, yams, beans, coffee, and tobacco. The inhabitants are mainly of Portuguese descent, indolent and devoid of enterprise. Principal exports: wine and brandy, oranges, maize, beans, pineapples, cattle. The climate is recommended as suitable for consumptive patients. The Azores were discovered by Cabral about 1431, shortly after which date they were taken possession of and colonized by the Portuguese. When first visited they were uninhabited, and had scarcely any other animals except birds, particularly hawks, to which, called in Portguese *açores*, the islands owe their name. Pop. 256,474.

Azote (az′ōt), a name formerly given to nitrogen; hence substances containing nitrogen and forming part of the structure of plants and animals are known as *azotized* bodies. Such are albumen, fibrin, casein, gelatin, urea, creatin, etc.

Azov. See *Azof.*

Azpeitia (àth-pā′i-ti-à) a town of N. E. Spain, prov. Guipuzcoa. Near it is the convent of Loyola, a large edifice, now a museum. Pop. 6066.

Azrael. See *Asrael.*

Aztecs (az′teks), a race of people who settled in Mexico early in the fourteenth century, ultimately extended their dominion over a large territory, and were still extending their supremacy at the time of the arrival of the Spaniards, by whom they were speedily subjugated. Their political organization, termed by the Spanish writers an absolute monarchy, appears to have consisted of a military chief exercising important, but not unlimited power in civil affairs, in which the council of chiefs and periodic assemblies of the judges had also a voice. Their most celebrated ruler was Montezuma, who was reigning when the Spaniards arrived, about the middle of the fifteenth century. It is inferred that considerable numbers of them lived in large communal residences, and that land was held and cultivated upon the communal principle. Slavery and polygamy were both legitimate, but the children of slaves were regarded as free. Although not possessing the horse, ox, etc., they had a considerable knowledge of agriculture, maize and the agave being the chief produce. Silver, lead, tin, and copper were obtained from mines, and gold from the surface and river beds, but iron was unknown to them, their tools being of bronze and obsidian. In metal-work, feather-work, weaving, and pottery, they possessed a high degree of skill. To record events they used an unsolved hieroglyphic writing, and their lunar calendars

were of unusual accuracy. Two special deities claimed their reverence: Huitzilopochtli, the god of war, propitiated with human sacrifices; and Quetzalcoatl, the beneficent god of light and air, with whom at first the Aztecs were disposed to identify Cortez. Their temples, with large terraced pyramidal bases, were in the charge of an exceedingly large priesthood, with whom lay the education of the young. As a civilization of apparently independent origin, yet closely resembling in many features the archaic oriental civilizations, the Aztec civilization is of the first interest, but in most accounts of it a large speculative element has to be discounted.

Azuline, Azurine (az'ū-līn, az'ū-rīn), light-blue dyes derived from coal-tar.

Azure (az'ūr), the heraldic term for the color blue, represented in engraving by horizontal lines.

Azurine (az'ū-rīn; *Leuciscus cœrulĕus*), a freshwater fish of the same genus as the roach, chub, and minnow, found in some parts of Europe, but rare in Britain; called also *Blue Roach.*

Azurite (az'ū-rīt), a blue mineral, a carbonate of copper, occurring in crystals which are rather brittle; called also *Blue Malachite.* Also a name of lazulite.

B

B is the second letter and the first consonant in the English and most other alphabets. It is a mute and labial, pronounced solely by the lips, and is distinguished from *p* by being sonant, that is, produced by the utterance of voice as distinguished from breath.

B, in *music*, the seventh note of the model diatonic scale or scale of C. It is called the leading note, as there is always a feeling of suspense when it is sounded until the keynote is heard.

Baader, Franz Xaver von (frantz zä fer fon bä'der), German philosopher, and the greatest speculative Roman Catholic theologian of modern times; born in Munich, 1765, died 1841. He studied engineering, became superintendent of mines, and was ennobled for his services. He was deeply interested in the religious speculations of Eckhart, St. Martin, and Böhme, and in 1826 was appointed professor of philosophy and speculative theology in the University of Munich. During the last three years of his life he was interdicted from lecturing for opposing the interference in civil matters of the Roman Catholic Church.

Baal (bā'al), Bel, a Hebrew and general Semitic word, which originally appears to have been generic, signifying simply lord, and to have been applied to many different divinities, or, with qualifying epithets, to the same divinity regarded in different aspects and as exercising different functions. Thus in Hos., ii, 16, it is applied to Jehovah himself, while *Baal-berith* (the Covenant-lord) was the god of the Shechemites, and *Baal-zebub* (the Fly-god) the idol of the Philistines at Ekron. Baal was the sacred title applied to the Sun as the principal male deity of the Phœnicians and their descendants, the Carthaginians, as well as of the ancient Canaanitish nations, and was worshiped as the supreme ruler and vivifier of nature. The word enters into the composition of many Hebrew, Phœnician, and Carthaginian names of persons and places: thus, *Jerubaal*, *Hasdrubal* (help of Baal), *Hannibal* (grace of Baal), and *Baal-Hammon*, *Baal-Thamar*, etc.

Baalbek (bål'bek; ancient *Heliopolis*, city of the sun), a place in Syria, in a fertile valley at the foot of Antilibanus, 40 miles from Damascus, famous for its magnificent ruins. Of these the chief is the temple of the Sun, built either by Antoninus Pius or by Septimius Severus. Some of the blocks used in its construction are 60 ft. long by 12 thick; and its 54 columns, of which 6 are still standing, were 72 ft. high and 22 in circumference. Near it is a temple of Jupiter, of smaller size, though still larger than the Parthenon at Athens, and there are other structures of an elaborately ornate type. Originally a center of the Sun-worship, it became a Roman colony under Julius Cæsar; was garrisoned by Augustus, and acquired increasing renown under Trajan as the seat of an oracle. Under Constantine its temples became churches, but after being sacked by the Arabs in 748, and more completely pillaged by Timur (Tamerlane) in 1401, it sank into hopeless decay. The work of destruction was completed by an earthquake in 1759.

Baal-zebub. See *Beelzebub*.

Baba (bá'bá), a cape near the northwest point of Asia Minor.

Babadag (bå-bå-däg'), a town of Roumania, capital of the Dobrudsha, carrying on a considerable Black Sea trade. Pop. about 3500.

Babbage (bab'aj), Charles, an English mathematician and the inventor of the calculating machine; born in 1792; died in 1871. He graduated at Cambridge in 1814, and was professor of mathematics for eleven years, but delivered no lectures. As early as 1812 he conceived the idea of calculating numerical tables by machinery, and in 1823 he received a grant from government for the construction of such a machine. After a series of experiments lasting eight years, and an expenditure of $85,000 ($30,000 of which was sunk by himself, the balance voted by government), Babbage abandoned the undertaking in favor of a much more enlarged work, an analytical engine, worked with

cards like the jacquard loom; but the project was never completed. The incomplete machine is now in the South Kensington Museum.

Babbitt Metal (bab'it met'al), a soft metal resulting from alloying together certain proportions of copper, tin, and zinc or antimony, used with the view of as far as possible obviating friction in the bearings of journals, cranks, axles, etc., invented by Isaac Babbitt (1799–1862), a goldsmith of Taunton, Massachusetts.

Babel, the same as *Babylon.*

Babel, Tower of, according to the 11th chapter of Genesis, a structure in the Plain of Shinar, Mesopotamia, commenced by the descendants of Noah subsequent to the deluge, but not completed. It has commonly been identified with the great temple of Belus or Bel that was one of the chief edifices in Babylon, and the huge mound called Birs Nimrud is generally regarded as its site, though another mound, which to this day bears the name of Babil, has been assigned by some as its site. Babel means literally 'gate of God.' The meaning 'confusion' assigned to it in the Bible really belongs to a word of similar form. See *Babylon.*

Bab-el-Mandeb ('gate of tears,' from being dangerous to small craft), a strait, 15 miles wide, between the Indian Ocean and the Red Sea, formed by projecting points of Arabia in Asia, and Abyssinia in Africa. The island of Perim is here.

Baber (bå'ber), the first Grand Mogul and the founder of the Mogul dynasty in Hindustan, born in 1483; died 1530. He was a grandson of the great Tartar prince Timur or Tamerlane, and was sovereign of Cabul. He several times invaded Hindustan, and in 1525 finally defeated and killed Sultan Ibrahim, the last Hindu emperor of the Patan or Afghan race. He made many improvements, social and political, in his empire, and left a valuable autobiography.

Babeuf (bå-beuf), François Noel, a personage connected with the French Revolution, born about 1764. He started a democratic journal at Paris, called *Le Tribun du Peuple, par Gracchus Babeuf,* which advocated communistic views, and wrote with great severity against the Jacobins. After the fall of Robespierre, to which he powerfully contributed, he openly attacked the terrorists, and advocated the most democratic principles. He was accused of a conspiracy against the directorial government, condemned to death, and guillotined in 1797.

Babington, Anthony, a Catholic gentleman of Derbyshire, who was accused with others of his own persuasion of plotting to assassinate Queen Elizabeth, and deliver Mary, Queen of Scots. They were executed in 1586.

Babiroussa (bab-i-rö'sa). See *Babyroussa.*

Babism, (bä'bism) now Bahaism, a religion founded in Persia, A.D. 1844. The founder, Mirza Ali Mohammed, was born at Shiraz in 1820, and as leader of the Shaykhi School was proclaimed the long-expected Bab, or Gateway of Revelation. In 1844 he went to Mecca and declared himself the Forerunner of Imam-Mahdi, who had disappeared a thousand years previously. He was imprisoned, and while in prison worked out an entirely new system of philosophy. His disciples soon proclaimed him the complete Divine Manifestation, and began to explain away the outward forms of Moslem religion as symbols, putting many of their reforms into practice. Moslem officials oppressed the Babis, and the Bab was finally put to death. In 1863 Baha 'u 'llah succeeded to the leadership, and while in exile of over twenty years at Acre composed most of the sacred writings of the faith. Bahaism maintains that no revelation is final, and aims to unite people of all faiths without asking them to desert the religions with which they are affiliated. As practical reforms Bahaism urges the substitution of arbitration for war, woman suffrage, monogamic marriage, and a universal language. Upon the death of Baha 'u 'llah in 1892, his eldest son, Abdul Baha, became the acknowledged spiritual leader.

Baboo, or Babu, a Hindu title of respect equivalent to *sir* or *master,* usually given to wealthy and educated native gentlemen; now often used as a word of contempt.

Baboon (ba-bön'), the common name applied to a division of old-world quadrumana (apes and monkeys), comprehending the genera *Mandrilla* and *Papio.* They have elongated abrupt muzzles like a dog, strong tusks or canine teeth, usually short tails, cheek-pouches, small, deep eyes with large eyebrows, and naked callosities on the buttocks. Their hind and fore feet are well proportioned, so that they run easily on all fours, but they do not maintain themselves in an upright posture with facility. They are generally of the size of a moderately large dog, but the largest, the mandrill, is, when erect, nearly of the height of a man. They are almost all African, ugly, sullen,

fierce, lascivious, and gregarious, defending themselves by throwing stones, dirt, etc. They live on fruits and roots, eggs and insects. They include the chacma, drill, common baboon and mandrill. The chacma or pig-tailed baboon (*Cynocephălus porcarius*) is found in considerable numbers in parts of the S. African colonies, where the inhabitants wage war

Baboon (*Cynocephălus babouin*).

against them on account of the ravages they commit in the fields and gardens. The common baboon (*C. babouin*) inhabits a large part of Africa farther to the north. It is of a brownish-yellow color, while the chacma is grayish black, or in parts black. The hamadryas (*C. hamadryas*) of Abyssinia is characterized by long hair, forming a sort of shoulder cape. The black baboon (*C. niger*) is found in Celebes.

Babour (bä'bụr). Same as *Baber*.

Babrius (bā'bri-us), a Greek poet who flourished during the second or third century of the Christian era, and wrote a number of Æsopian fables. Several versions of these made during the middle ages have come down to us as Æsop's fables. In 1840 a manuscript containing 120 fables by Babrius, previously unknown, was discovered on Mount Athos.

Babuyanes (bå-bu-yä'nes) Islands, a group in the Pacific Ocean, between Luzon and Formosa, chiefly of volcanic origin. Pop. 8000.

Babylon (bab'i-lon), the capital of Babylonia, on both sides of the Euphrates, one of the largest and most splendid cities of the ancient world, now a scene of ruins, and earth-mounds containing them. Babylon was a royal city more than 3000 years before the Christian era; but the old city was almost entirely destroyed in 689 B.C. A new city was built by Nebuchadnezzar nearly a century later. This was in the form of a square, each side 15 miles long, with walls of such immense height and thickness as to constitute one of the wonders of the world. It contained splendid edifices, large gardens and pleasure-grounds, especially the 'hanging-gardens,' a sort of lofty, terraced structure supporting earth enough for trees to grow, and the celebrated tower of Babel or temple of Belus, rising by stages to the height of 625 ft. (See *Babel, Tower of*.) After the city was taken by Cyrus in 538 B.C., and Babylonia made a Persian province, it began to decline, and had suffered severely by the time of Alexander the Great. He intended to restore it, but was prevented by his death, which took place here in 323 B.C., from which time its decay was rapid. Interesting discoveries have been made on its site in recent times, more especially of numerous and valuable inscriptions in the cuneiform or arrow-head character. The modern town of Hillah is believed to represent the ancient city, and the plain here for miles round is studded with vast mounds of earth and brick and imposing ruins. The greatest mound is Birs Nimrud, about 6 miles from Hillah. It rises nearly 200 ft., is crowned by a ruined tower, and is commonly believed to be the remains of the ancient temple of Belus.

Babylon, Long Island, New York, a favorite summer resort: 37 miles east of Queens Borough. Pop. 9030.

Babylonia (now *Irak Arabi*), an old Asiatic empire occupying the region watered by the lower course of the Euphrates and the Tigris, and by their combined stream. The inhabitants, though usually designated Babylonians, were sometimes called Chaldeans, and it is thought that the latter name represents a superior caste who at a comparatively late period gained influence in the country. At the earliest period of which we have record the whole valley of the Tigris and Euphrates was inhabited by tribes apparently of Turanian or Tartar origin. Along with these, however, there early existed an intrusive Semitic element, which gradually increased in number till at the time the Babylonians and Assyrians (the latter being a kindred people) became known to the western historians

they were essentially Semitic peoples. The great city Babylon (which see), or Babel, was the capital of Babylonia, which was called by the Hebrews Shinar. There seem originally to have been two sections; Accad, which lay to the north, and Shumer, which lay to the south, and the people are often called Accadians. There is some reason to believe that civilization began here 7000 or 8000 years before Christ, as estimated by Professor Hilprecht. If so, Babylonia may have been the earliest of civilized states, its only rival in antiquity being Egypt. The country was, as it still is, exceedingly fertile, and must have anciently supported a dense population. It was then widely irrigated, though the canals have long sunk into decay. The chief cities, besides Babylon, were Ur, Calneh, Erech, and Sippara. Babylonia and Assyria were often spoken of together as Assyria.

The discovery and interpretation of the cuneiform inscriptions have enabled the history of Babylonia to be carried back to at least 4000 B.C., at which period the inhabitants had attained a considerable degree of civilization, and the country was ruled by a number of kings or princes each in his own city. In later centuries single monarchs rose at times to the control of the whole country, and invaded the surrounding nations; the earliest and most famous of these being Sargon, about 3800 B.C. Several hundred years previous to 2000 B.C. Babylonia was conquered by and held subject to the neighboring Elam. It then regained its independence, and for nearly a thousand years it was the foremost state of Western Asia in power, as well as in science, art, civilization. The rise of the Assyrian Empire brought about the decline of Babylonia, which later was under Assyrian domination, though with intervals of independence. Tiglath-Pileser II of Assyria (745–727) made himself master of Babylonia; but the conquest of the country had to be repeated by his successor, Sargon, who expelled the Babylonian king, Merodach-Baladan, and all but finally subdued the country, the complete subjugation being effected by Sennacherib. After some sixty years a second Babylonian empire arose under Nabopolassar, who, joining the Medes against the Assyrians, freed Babylon from the superiority of the latter power, 625 B.C. The new empire was at its height of power and glory under Nabopolassar's son, Nebuchadnezzar (604–561), who subjected Jerusalem, Tyre, Phœnicia, and even Egypt, and carried his dominion to the shores of the Mediterranean and northwards to the Armenian mountains. The capital, Babylon, was rebuilt by him, and then formed one of the greatest and most magnificent cities the world has ever seen. He was succeeded by his son Evil-Merodach, but the dynasty soon came to an end, the last king being Nabonidus, who came to the throne in B.C. 555, and made his son, Belshazzar, co-ruler with him. Babylon was taken by Cyrus the Persian monarch in 538, and the second Babylonian empire came to an end, Babylonia being incorporated in the Persian empire. Its subsequent history was similar to that of Assyria.

The account of the civilization, arts, and social advancement of the Assyrians already given in the article *Assyria* may be taken as generally applying also to the Babylonians, though certain differences existed between the two peoples. In Babylonia stone was not to be had, and consequently brick was the almost universal building material. Sculpture was thus less developed in Babylonia than in Assyria; and painting more. Babylonian art had also more of a religious character than that of Assyria, and the chief edifices found in ruins are temples. Weaving and pottery were carried to high perfection. Astronomy was cultivated from the earliest times. The Babylonians had a number of deities, but eventually the chief or national deity was Bel Merodach, originally the Sun-god. Education was well attended to, and there were schools and libraries in connection with the temples. The later Assyrian culture was based on that of Babylonia, which had been a nation of writers and students for many earlier centuries.

Babylonish CAPTIVITY, a term usually applied to the deportation of the two tribes of the kingdom of Judah to Babylon by Nebuchadnezzar, 588 B.C. The duration of this captivity is usually reckoned as seventy years, from the first deportation in 606 to Cyrus's proclamation in 536. A great part of the ten tribes of Israel had been previously taken captive to Assyria.

Babyroussa (bab-i-rus'a; a Malay word signifying stag-hog), a species of wild hog (*Sus* or *Porcus Babyrussa*), a native of the Indian Archipelago. From the outside of the upper jaw spring two teeth 12 inches long, curving upwards and backwards like horns, and almost touching the forehead. The tusks of the lower jaw also appear externally, though they are not so long as those of the upper jaw. Along the back are some weak bristles, and on

the rest of the body only a sort of wool. The skin of the babyroussa is comparatively smooth. The object of the upper tusks is not apparent, but it is supposed that the animal was accustomed to suspend himself to branches by means of these curved tusks. Another explanation offered is that ages ago they were straight, but were kept worn down by constant use.

Babyroussa (*Sus Babyrussa*)

Changed conditions have made them unnecessary and through disuse they have assumed distorted forms. It is a very dangerous animal and is able to inflict terrible wounds with the lower tusks.

Baccarat (bak'a-rat or bak-a-rä'), a gambling game of French origin, played by any number of players, or rather bettors, and a banker. The latter deals two cards to each player and two to himself, and covers the stakes of each with an equal sum. The cards are then examined, and according to the scores made the players take their own stake and the banker's or the latter takes all or a certain number of the stakes.

Bacchanalia, or DIONYSIA (bak-a-nā'li-a; dī-ō-niz'i-a), feasts in honor of Bacchus or Dionysus, characterized by licentiousness and revelry, and celebrated in ancient Athens. In the processions were bands of Bacchanals of both sexes, who, inspired by real or feigned intoxication, wandered about rioting and dancing. They were clothed in fawn-skins, crowned with ivy, and bore in their hands *thyrsi*, that is, spears entwined with ivy, or having a pine-cone stuck on the point. These feasts passed from the Greeks to the Romans, who celebrated them with still greater dissoluteness till the senate abolished them B.C. 187.

Bacchante (bak-an'te), a woman taking part in revels in honor of Bacchus. See *Bacchanalia.*

Bacchiglione (bäk-kil'yō-nā), a river of Northern Italy, which rises in the Alps, passes through the towns of Vicenza and Padua, and enters the Adriatic near Chioggia, after a course of about 90 miles.

Bacchus (bak'us: in Greek, generally named *Dionysos*), the god of wine, son of Zeus (Jupiter) and Sĕmĕlē. He first taught the cultivation of the vine and the preparation of wine. To spread the knowledge of his invention he traveled over various countries and received in every quarter divine honors. Drawn by lions (some say panthers, tigers, or lynxes), he began his march, which resembled a triumphal procession. Those who opposed him were severely punished, but on those who received him hospitably he bestowed rewards. His love was shared by several; but Ariadne, whom he found deserted upon Naxos, alone was elevated to the dignity of a wife, and became a sharer of his immortality. In art he is represented with the round, soft, and graceful form of a maiden rather than with that of a young man. His long, waving hair is knitted behind in a knot, and wreathed with sprigs of ivy and vine leaves. He is usually naked; sometimes he has an ample mantle hung negligently round his shoulders; sometimes a fawn-skin hangs across his breast. He is often accompanied by Silenus, Bacchantes, Satyrs, etc. See *Bacchanalia.*

Bacchylides (bak-kil'i-dēz), born in the island of Ceos, about the middle of the 5th century B.C. the last of the great lyric poets of Greece, a nephew of Simonides and a contemporary of Pindar. Of his odes, hymns, pæans, triumphal songs, only a few fragments remain.

Bacciocchi (bät-chok'ē), MARIA ANNE ELIZA BONAPARTE, sister of Napoleon, born at Ajaccio 1777, died near Trieste 1820; a great patroness of literature and art. She married Captain Bacciocchi, who in 1805 was created Prince of Lucca and Piombino. She virtually ruled these principalities herself, and as Grand-duchess of Tuscany she enacted the part of a queen. She fell with the empire.

Baccio Della Porta (bäch'ō), an Italian painter, better known under the name of *Fra Bartolommeo*, born near Florence 1475; died 1517. He studied painting in Florence, and acquired a more perfect knowledge of art from the works of Leonardo da Vinci. He was an admirer and follower of Savonarola, on whose death he took the Dominican habit, and assumed the name of *Fra Bartolommeo.* He was the friend of Michael Angelo and Raphael; painted many religious pictures, among them a *Saint Mark* and *Saint Sebastian*, which are greatly admired. His coloring, in vigor and brilliancy, comes near to that of Titian and Giorgione.

Bach (bäh), JOHANN SEBASTIAN, one of the greatest of German musicians, was born in 1685, at Eisenach:

died in 1750, at Leipzig. Being the son of a musician, he was early trained in the art, and soon distinguished himself. In 1703 he was engaged as a player at the court of Weimar, and subsequently he was musical director to the Duke of Anhalt-Köthen, and afterwards held an appointment at Leipzig. He paid a visit to Potsdam on the invitation of Frederick the Great. As a player on the harpsichord and organ he had no equal among his contemporaries; but it was not till a century after his death that his greatness as a composer was fully recognized. His compositions breathe an original inspiration, and are largely of the religious kind. They include pieces, vocal and instrumental, for the organ, piano, and stringed and keyed instruments; also church cantatas, oratorios, masses, passion music, etc. More than fifty musical performers have proceeded from his family. Sebastian himself had eleven sons, all distinguished as musicians. The most renowned were the following:—WILHELM FRIEDEMANN, born in 1710 at Weimar; died at Berlin in 1784. He was one of the most scientific harmonists and most skillful organists.—KARL PHILIP EMMANUEL, born in 1714 at Weimar; died in 1788 at Hamburg. He composed mainly for the piano, and published melodies for Gellert's hymns.

Bach Choir, a famous community chorus of Bethlehem, Pennsylvania, and an important influence in American choral music. An outgrowth of the Bethlehem Choral Union (1882-1892), its origin and success are largely due to its founder and conductor, Dr. J. Fred Wolle. Formally organized in 1900, it gave on March 27 of that year its first Bach Festival with the first complete American rendition of Bach's great "Mass in B Minor." Five annual Festivals followed, all attracting wide attention in musical circles. Disbanded in 1905 when Dr. Wolle became head of the music department in the University of California, it was reorganized upon his return to Bethlehem in 1911, and Festivals have since been given annually in the Packer Memorial Church. Beginning with a nucleus of 80 in 1898 the chorus numbered 350 in 1921. The orchestra at first included only local players, but in recent years members of the Philadelphia Orchestra have participated. The high distinction attained by the choir is due to the genius of its conductor, the devotion of its members to the pursuit of the highest ideals in musical art, and the loyalty of the community supporting it. No similar organization has surpassed the Choir in artistic accomplishment, and its record forms a notable chapter in the history of music in America.

Bache (bāch), ALEXANDER DALLAS, a grandson of Benjamin Franklin, born in Philadelphia, 1806, and in 1825 a graduate of the U. S. Military Academy. Professor in the University of Pennsylvania 1828-36, and president of Girard College trustees 1836-42, he was afterwards superintendent of the United States coast survey. He died in 1867.

Bache, FRANKLIN, an American chemist and physician (1792-1864), born in Philadelphia. He was professor of chemistry at the Jefferson Medical College, Philadelphia, from 1814. Co-author of a *Dispensatory* with G. Wood.

Bache, RENÉ, an American journalist, born in Philadelphia in 1861. Author of numerous popular science works.

Bacheller (bach'e-lėr), IRVING (Addison), journalist and author, born at Pierpoint, New York, in 1859; became one of the editors of the *New York World*. He is the author of numerous tales and poems, also the novels: *The Master of Silence*, *The Still House of O'Darrow*, *Eben Holden*, which had an enormous sale; also *D'ri and I*, *Darrel of the Blessed Isles*, *The Handmade Gentleman*, *Keeping Up with Lizzie*, *Marryers*, *A Man for the Ages*, etc.

Bachelor (bach'e-lor), a term applied anciently to a person in the first or probationary stage of knighthood, who had not yet raised his standard in the field. It also denotes a person who has taken the first degree in the liberal arts and sciences at a college or university; or a man who has not been married.—A *knight bachelor* is one who has been raised to the dignity of a knight without being made a member of any of the orders of chivalry, such as the Garter or the Thistle.

Bachelor's Button, the name given to several species of cultivated flowering plants: the cornflower (*Centaurea cyanus*) and the globe amaranth (*Gomphrena amaranthus*); also several wild forms, the most common of which (*Ranunculus repens*) is also sometimes cultivated.

Bacillaria (ba-sil-lā'ri-a), a genus of microscopical algæ belonging to the class Diatomaceæ, the siliceous remains of which abound in cretaceous, tertiary, and more recent geological deposits.

Bacillus (ba-sil'us), the name applied to certain minute rod-like microscopical organisms (Bacteria) which often appear in putrefactions, and one of which is known to hold a constant causative relation to tubercle in the lung

and to be present in all cases of phthisis. Others are known to be connected with anthrax, typhoid fever, diphtheria, and other epidemic diseases. See *Bacteria.*

Back, Admiral Sir George, an eminent English Arctic discoverer, born 1796, died 1878. He accompanied Franklin and Richardson in their northern expeditions, and in 1833-34 headed an expedition to the Arctic Ocean through the Hudson Bay Company's territory, on which occasion he wintered at the Great Slave Lake, and discovered the Back or Great Fish river. He contemplated proceeding along the coast to Cape Turnagain, but was hindered by the ice, and returned by the river. His expedition was undertaken primarily with the object of rescuing Captain Sir John Ross (q. v.), who was supposed to have been lost in his attempt to discover the Northwest Passage, but who, as a matter of fact, was able, after many hardships, to win his way out from the frozen circle and was picked up by the *Isabella* in August, 1833. Sir George Back learned of the return of Captain Ross, but continued his explorations and did not return to England till 1835. He was knighted in 1839; attained flag rank in 1857; admiral, 1867.

Backergunge. See *Bakarganj.*

Backgammon (bak-gam'un), a game played by two persons upon a table or board made for the purpose, with pieces or men, dice-boxes, and dice. The table is in two parts, on which are twenty-four black and white spaces called points. Each player has fifteen men of different colors for the purpose of distinction. The movements of the men are made in accordance with the numbers turned up by the dice.

Backhuysen (bāk'hoi-zn), Ludolf, a celebrated painter of the Dutch school, particularly in sea pieces, born in 1631, died 1709. His most famous picture is a sea piece which the burgomasters of Amsterdam commissioned him to paint as a present to Louis XVI. It is still at Paris.

Bacninh (bak'nin), a town of Tonquin, on the Red River, fortified and containing a French garrison, being in an important strategic position. Pop. 7000.

Bacon (bā'kun), Anthony, elder brother to the celebrated lord-chancellor, was born in 1558 and died in 1601. He was an astute politician and much devoted to learned pursuits. He became personally acquainted with most of the foreign literati of the day, and gained the friendship of Henry IV of France. Lord Bacon dedicated to him the first edition of the *Essays.*

Bacon, Francis, Baron of Verulam, Viscount St. Albans, and Lord High Chancellor of England; was born at London in 1561, died at Highgate in 1626. His father, Nicholas Bacon, was keeper of the great seal under Queen Elizabeth. (See *Bacon, Nicholas.*) He was educated at Trinity College, Cambridge, and in 1575 was admitted to Gray's-Inn. In 1576–79 he was at Paris with Sir Amyas Paulet, the English ambassador. The death of his father called him back to England, and being left in straitened circumstances, he zealously pursued the study of law, and was admitted a barrister in 1582. In 1584 he became member of parliament for Mel-

Lord Bacon.

combe Regis, and soon afterward drew up and addressed to Queen Elizabeth, an able political memoir. In 1586 he was member for Taunton, in 1589 for Liverpool. A year or two after he gained the Earl of Essex as a friend and patron. Unluckily he had displeased the queen, and when he applied for the solicitor-generalship (1595), he was unsuccessful. Essex endeavored to indemnify him by the donation of an estate in land. Bacon, however, forgot his obligations to his benefactor, and not only abandoned him as soon as he had fallen into disgrace, but without being obliged took part against him on his trial, in 1601, and was active in obtaining his conviction. He had been chosen member for the county of Middlesex in 1593, and for Southampton in 1597, but his affairs were not prospering. The reign of James

I was more favorable to his interest. He was assiduous in courting the king's favor, and James, who was ambitious of being considered a patron of letters, conferred upon him in 1603 the order of knighthood. In 1604 he was appointed king's counsel, with a pension of $300; in 1606 he married; in 1607 he became solicitor-general, and six years after attorney-general. He was anxious to produce harmony between James and his parliament, but his efforts were without avail, and his obsequiousness and servility gained him enmity and discredit. In 1617 he was made lord-keeper of the seals; in 1618 Lord High Chancellor of England and Baron Verulam. His fame became increased by the publication, in 1620, of his most celebrated work, the famous *Novum Organum*. Soon after this his reputation received a fatal blow. A new parliament was formed in 1621, and the lord-chancellor was accused before the house of bribery, corruption, and other malpractices. It is difficult to ascertain the full extent of his guilt; but he seems to have been unable to justify himself, and handed in a 'confession and humble submission,' throwing himself on the mercy of the Peers. He was condemned to pay a fine of $200,000, to be committed to the Tower during the pleasure of the king, declared incompetent to hold any office of state, and banished from court for ever. The sentence, however, was never carried out. The fine was remitted almost as soon as imposed, and he was imprisoned for only a few days. He survived his fall a few years, during this time occupying himself with his literary and scientific works, and vainly hoping for political employment. In 1597 he published his celebrated *Essays*, which immediately became very popular, were successively enlarged and extended, and translated into several of the European tongues. The treatise on the *Advancement of Learning* appeared in 1605; *The Wisdom of the Ancients* in 1609 (in Latin); his great philosophical work, the *Novum Organum* (in Latin), in 1620; and the *De Augmentis Scientiarum*, a much enlarged edition (in Latin) of the *Advancement*, in 1623. His *New Atlantis* was written about 1614–17; *Life of Henry VII* about 1621. Various minor productions also proceeded from his pen. Numerous editions of his works have been published, by far the best being that of Messrs. Spedding, Ellis, & Heath (1858–74). Bacon was great as a moralist, a historian, a writer on politics, and a rhetorician; but it is as the father of the inductive method in science, as the powerful exponent of the principle that facts must be observed and collected before theorizing, that he occupies the grand position he holds among the world's great ones. His moral character, however, was not on a level with his intellectual, self-aggrandizement being the main aim of his life. We need do no more than allude to the preposterous attempt that has been made to prove that Bacon was the real author of the plays attributed to Shakspere, an attempt that only ignorance of Bacon and Shakspere could uphold and tolerate.

Bacon, John, an English sculptor, born 1740; died 1799. Among his chief works are two groups for the interior of the Royal Academy; the statue of Judge Blackstone for All Souls College, Oxford; another of Henry VI for Eton College; the monument of Lord Chatham in Westminster Abbey; and the statues of Dr. Johnson and Mr. Howard in St. Paul's Cathedral.

Bacon, Sir Nicholas, father of Lord Bacon, lord-keeper of the great seal, born 1510, died 1579. Henry VIII gave him several lucrative offices, which he retained under Edward VI. He lived in retirement during the reign of Mary, but Queen Elizabeth appointed him lord-keeper for life. He was the intimate friend of Lord Burleigh, a sister of whose wife he married, and by her became the father of the great chancellor.

Bacon, Roger, an English monk, and one of the most profound and original thinkers of his day, was born about 1214, near Ilchester, Somersetshire; died at Oxford in 1294. He first entered the University of Oxford, and went afterwards to that of Paris, where he is said to have distinguished himself and received the degree of Doctor of Theology. About 1250 he returned to England, entered the order of Franciscans, and fixed his abode at Oxford, but having incurred the suspicion of his ecclesiastical superiors he was sent to Paris and kept in confinement for ten years, without writing materials, books, or instruments. The cause seems to have been simple enough. He had been a diligent student of the chemical, physical, and mathematical sciences, and had made discoveries, and deduced results, which appeared so extraordinary to the ignorant that they were believed to be works of magic. This opinion was countenanced by the jealousy and hatred of the monks of his fraternity. In subsequent times he was popularly classed among those who had been in league with Satan. Having been set at liberty he enjoyed a brief space of quiet while Clement IV was pope; but in 1278 he was again thrown into prison, where he re-

mained for at least ten years. Of the close of his life little is known. His most important work is his *Opus Majus*, where he discusses the relation of philosophy to religion, and then treats of language, metaphysics, optics, and experimental science. He was undoubtedly the earliest philosophical experimentalist in Britain; he made signal advances in optics; was an excellent chemist; but it was not he who discovered gunpowder, as has been stated, though he was probably familiar with its explosive property. He was intimately acquainted with geography and astronomy, as appears by his discovery of the errors of the calendar, and their causes, and by his proposals for correcting them, in which he approached very near the truth.

Bacon's Rebellion, an insurrection in Virginia in 1676, which arose from Indian depredations and the neglect of Sir William Berkeley, the governor, to send troops against them. A force of planters, led by Nathaniel Bacon, proceeded against them, and when proclaimed a traitor by Berkeley attacked him in Jamestown and burned the town. His sudden death left his followers to the vengeance of Berkeley, who executed a number of their leaders.

Bacteria (bak-tē'ri-a; Gr. *baktērion*, a rod), a class of very minute microscopical organisms, often of a rod-like form, which are regarded as of vegetable nature, and as being the cause of putrefaction; they are also called *microbes* or *microphytes*. The genus *Bacterium*, in a restricted sense, comprises microscopical, unicellular, rod-shaped vegetable organisms, which multiply by transverse division of the cells. Species are found in all decomposing animal and vegetable liquids. The bacilli (see *Bacillus*) are often spoken of as bacteria, this latter term being used in a wide sense and comprising organisms of various forms and with several distinct names, as *spirillum*, *micrococcus*, etc. They consist of a mass of protoplasm enclosed in a membrane, and all have at some stage or other cilia serving for locomotion. Reproduction is asexual and by division. For their importance to man in regard to their connection with disease see *Germ Theory*.

Bacteria in Milk. (Greatly Enlarged.)

Bactriana (bak-tri-ä'nȧ), or BACTRIA, a country of ancient Asia, south of the Oxus and reaching to the west of the Hindu Kush. It is often regarded as the original home of the Indo-European races. A Græco-Bactrian kingdom flourished about the third century B.C., but its history is obscure.

Bactris (bak'tris), a genus of American palms, the species generally small, one with a stem no thicker than a goose quill; some spiny and forming close thickets. The *Maraja* has edible fruit clusters like grapes and its stem is used for walking sticks.

Baculite (bak'ū-līt), a genus of fossil ammonites, characteristic of the chalk, having a straight tapering shell.

Bacup (bak'up), a municipal borough of England, in Lancashire, 18 miles N. of Manchester. The chief manufacturing establishments are connected with cotton-spinning and power-loom weaving; there are also iron-works, Turkey-red dyeing works, and in the neighborhood numerous coal-pits and immense stone quarries. Pop. 22,505.

Badagry (bȧ-dȧg'rē), a British seaport on the Slave Coast, Upper Guinea, 50 miles E. N. E. of Whydah.

Badajoz (bȧ-*dȧ-hōth'*; anc. *Pax Augusta*), the fortified capital of the Spanish province of Badajoz, on the left bank of the Guadiana, which is crossed by a stone bridge of twenty-eight arches. It is a bishop's see, and has an interesting cathedral. During the Peninsular war Badajoz was besieged by Marshal Soult, and taken in March, 1811. It was retaken by Wellington on 6th April, 1812. Pop. 30,899.

Badakshan (bȧ-dȧk-shȧn'), a territory of Central Asia, tributary to the Ameer of Afghanistan. It has the Oxus on the north and the Hindu Kush on the south; and has lofty mountains and fertile valleys; the chief town is Faizabad. The inhabitants profess Mohammedanism. Pop. about 100,000.

Badalona (ba-dȧ-lō′nȧ), a Mediterranean seaport of Spain, 5 miles from Barcelona. Pop. 19,240.

Badderlocks (ba d′e r-l o k s), also called *Honeyware* or *Henware*, an olive-colored sea-weed (*Alaria esculenta*). It is eaten by the coast people of Iceland, Denmark, Scotland, Ireland, etc., and is said to be the best of the esculent algæ.

Baden (bä′dėn), formerly a grand duchy, now a free state within the German Republic, situated in the S. W. of Germany, to the west of Würtemberg. It is divided into four districts, Constance, Freiburg, Carlsruhe, and Mannheim; has an area of 5824 sq. miles, and a pop. of 2,009,320. It is mountainous, being traversed to a considerable extent by the lofty plateau of the Schwarzwald or Black Forest, which attains its highest point in the Feldberg (4904 ft.). The nucleus of this plateau consists of gneiss and granite. In the north it sinks down towards the Odenwald, which is, however, of different geological structure, being composed for the most part of red sandstone. The whole of Baden, except a small portion in the S. E., in which the Danube takes its rise, belongs to the basin of the Rhine, which bounds it on the south and west. Numerous tributaries of the Rhine intersect it, the chief being the Neckar. Lakes are numerous, and its waters include a considerable part of the Lake of Constance. The climate varies much. The hilly parts, especially in the east, are cold and have a long winter, while the valley of the Rhine enjoys the finest climate of Germany. The principal minerals worked are coal, salt, iron, zinc, and nickel. The number of mineral springs is remarkably great, and of these not a few are of great celebrity. The vegetation is peculiarly rich, and there are magnificent forests. The cereals comprise wheat, oats, barley, and rye. Potatoes, hemp, tobacco, wine, and sugar-beet are largely produced. Several of the wines, both white and red, rank in the first class. Baden has long been famous for its fruits also. The farms are mostly quite small. The manufactures are important. Among them are textiles, tobacco and cigars, chemicals, machinery, pottery ware, jewelry (especially at Pforzheim), wooden clocks, confined chiefly to the districts of the Black Forest, musical boxes and other musical toys. The capital is Carlsruhe, about 5 miles from the Rhine; the other chief towns are Mannheim, Freiburg-im-Breisgau, with a Roman Catholic university; Baden, and Heidelberg. Baden has warm mineral springs, which were known and used in the time of the Romans. Heidelberg has a university (Protestant), founded in 1386, the oldest in the present German Empire. The railways are a well-managed system, and are nearly all state property. In the time of the Roman Empire southern Baden belonged to the Roman province of Rhætia. Under the old German Empire it was a margraviate, which in 1533 was divided into Baden-Baden and Baden-Durlach, but reunited in 1771. The title of grand-duke was conferred by Napoleon in 1806, and in the same year Baden was extended to its present limits. It remained a grand duchy till 1918, the final year of the European war (q. v.), when, following the defeat of Germany and the abdication of the German Emperor, it changed from a monarchy to a republic. On November 22, 1918, eleven days after the armistice that terminated the great war, the Grand Duke abdicated and Baden was proclaimed a republic.

The constitution provides for a single House (*Landtag*), elected by universal vote for four years. The Landtag chooses the State President and cabinet. It sends three members to the German Reichsrat.

Baden (or *Baden-Baden*, to distinguish it from other towns of the same name; German *Bad*, a bath), a town and watering-place, Free State of Baden, 18 miles S. S. W. Carlsruhe, built in the form of an amphitheater on a spur of the Black Forest, overhanging a valley, through which runs a little stream, Oosbach. Baden has been celebrated from the remotest antiquity for its thermal baths; and it used also to be celebrated for its gaming saloons. It has many good buildings, and a castle, the summer residence of the grand-duke. Pop. (1915) 22,066.

Baden, a town of Austria, 15 miles S. W. of Vienna. It has numerous hot sulphurous springs, used both for bathing and drinking, and very much frequented. Pop. 17,770.

Baden, a small town of Switzerland, canton Aargau, celebrated for its hot sulphurous baths, which attract many visitors. Pop. 6109.

Baden-Powell, Robert S. S., soldier, born in England in 1857. He joined the Thirteenth Hussars in 1876, and served in India, Afghanistan, Ashanti, and South Africa. He held Mafeking against the Boer assault in 1899 and was made a major-general for his gallant defense. He wrote *The Matabela Campaign* and other works. He instituted the Boy Scouts organization (q. v.).

Badge (baj), a distinctive device, emblem, mark, honorary decora-

tion, or special cognizance, used originally to identify a knight or distinguish his followers, now worn as a sign of office or licensed employment, as a token of membership in some society, or generally as a mark showing the relation of the wearer to any person, occupation, or order.

Badger (baj'ėr), a plantigrade, carnivorous mammal, allied both to the bears and to the weasels, of a clumsy make, with short, thick legs, and long claws on the forefeet. The common badger (*Meles vulgāris*) is as large as a middling-sized dog, but much lower on the legs, with a flatter and broader body, very thick, tough hide, and long, coarse hair. It inhabits the north of Europe and Asia, burrows, is indolent and sleepy, feeds by night on vegetables, small quadrupeds, etc. Its flesh may be eaten, and its hair is used for artists' brushes in painting. The American badger belongs to a separate genus, *Badger baiting*, or *drawing the badger*, is a barbarous sport, formerly and yet to some extent, practised, generally as an attraction to public-houses of the lowest sort. A badger is put in a barrel, and one or more dogs are put in to drag him out. When this is effected he is returned to his barrel, to be similarly assailed by a fresh set. The badger usually makes a most determined and savage resistance.

Badger Dog, a long-bodied, short-legged dog, with rather large, pendulous ears, usually short haired, black, and with yellow extremities; often called by its German name *Dachshund*.

Bad Lands, an extensive region in South Dakota, extending into Nebraska, so called from the French title *Mauvaises terres*. It is a hilly region of friable material which has been cut by rivers and streams into innumerable ravines, the worn hill faces often looking like massive works of architecture. The Sioux Indians formerly used these hills as a natural fortress, and more recently they have proved rich in fossil remains of ancient animals.

Badminton (bad'min-tun), an outdoor game closely resembling lawn-tennis, but played with battledore and shuttlecock instead of ball and racket: named after a seat of the Duke of Beaufort, in Gloucestershire.

Badrinath (ba-dri-nät'), a peak of the main Himalayan range, in Garhwâl District, Northwestern Provinces, 23,210 feet above the sea. On one of its shoulders at an elevation of 10,400 feet stands a celebrated temple of Vishnu, which some years attracts as many as 50,000 pilgrims.

Baedeker (bā'de-kėr), KARL, a German publisher, born 1801, died 1859; originator of a celebrated series of guide-books for travelers.

Baena (bá-ā'ná), a town of Spain, in Andalusia, province of and 24 miles S. S. E. from Cordova. Pop. 14,539.

Baeza (bä-ā'thä; anciently, *Beatia*), a town of Spain, in Andalusia, 22 miles E. N. E. from Jaen, with 14,379 inhabitants. The principal edifices are the cathedral, the university (now suppressed), and the old monastery of St. Philip de Neri.

Baffa (båf'få; anc. *Paphos*), a seaport on the S. W. coast of Cyprus. It occupies the site of New Paphos, which, under the Romans, was full of beautiful temples and other public buildings. Old Paphos stood a little to the southeast.

Baffin (baf'in), WILLIAM, an English navigator, born 1584; famous for his discoveries in the Arctic regions; in 1616 ascertained the limits of Baffin Bay; was killed at the siege of Ormuz, in the East Indies, in 1622.

Baffin Bay, on the N. E. of North America between Greenland and the islands that lie on the N. of the continent; discovered by Baffin in 1616.

Bagasse (ba-gas'), the sugar-cane in its dry crushed state as delivered from the mill, and after the main portion of its juice has been expressed; used as fuel in the sugar factory, and called also *cane-trash*.

Bagatelle (bag-a-tel'), a game played on a long, flat board covered with cloth like a billiard-table, with spherical balls and a cue or mace. At the end of the board are nine cups or sockets of just sufficient size to receive the balls. There are several varieties of the game, the score in all being decided by the greatest number of balls holed.

Bagdad (bág-dad' or bag'dad) or BAGHDAD, capital of vilayet of same name (54,540 sq. miles, 500,000 to 1,000,000 inhabitants), in the southern part of Mesopotamia (now *Irak Arabi*). The greater part of it lies on the eastern bank of the Tigris, which is crossed by a bridge of boats; old Bagdad, the residence of the caliphs (now in ruins), was on the western bank of the river. The modern city is surrounded with a brick wall about 6 miles in circuit; the houses are mostly built of brick, the streets unpaved and very narrow. The palace of the governor is spacious. Of the mosques, only a few attract notice; the bazaars are all large and well stocked; among their number are found some

of the most splendid in the world. Manufactures: leather, silks, cottons, woolens, carpets, etc. Steamers ply on the river between Bagdad and Bassorah, and the town exports wheat, dates, galls, gum, mohair, carpets, etc., to Europe. Bagdad is inhabited by Turks, Arabs, Persians, Armenians, Jews, etc., and a small number of Europeans. Estimated pop. over 225,000. The Turks compose three-fourths of the whole population. The

Bagdad, from the South.

city has been frequently visited by the plague, and in 1831 was nearly devastated by that calamity. Bagdad was founded in 762, by the Caliph Almansur, and raised to a high degree of splendor in the ninth century by Harun Al Rashid. It is the scene of a number of the tales of the 'Arabian Nights.' In the thirteenth century it was stormed by Hulaku, grandson of Genghis-Khan. It was captured from the Turks by a British army in 1917, during the European war.

Bagehot (bāj'ot), WALTER, an English economist and journalist, born at Langport, Somerset, in 1826; died at the same place in 1877. He graduated at the London University, 1848, and was for some time associated with his father in the banking business in London. He was one of the editors of the *National Review* (1855–64), and from 1860 till his death he was editor and part proprietor of the *Economist*. His chief works are: *Physics and Politics*, *The English Constitution*, *Lombard Street*, and *Studies, Literary, Biographic, and Economic*.

Baggala (bag'a-la), a two-masted Arab boat, generally 200–250 tons burden, used for trading in the Indian Ocean, Red Sea, etc.

Baggesen (bàg'e-sen), JENS, a Danish poet, who also wrote much in German; born 1764, at Korsör; died at Hamburg, 1826. He tried lyric, epic, dramatic poetry, and both serious and humorous verse. His best productions are his smaller poems and songs, several of which are very popular with his countrymen.

Baghelkhand (bà-gel-kànd'), a tract of country in Central India, occupied by a collection of native states (Rewah being the chief), under the governor-general's agent for Central India.

Bagheria (bä-gå-rē'å), a town of Sicily, 7 miles east of Palermo. Pop. 17,200.

Bagirmi (bà-gir'mē), or BAGHERMI, a Mohammedan negro state in Central Africa, situated between Bornu and Waday, to the south of Lake Tchad. It is mostly a plain; has an area of about 56,000 sq. miles, and about 1,500,000 inhabitants. The people are industrious, and have attained a considerable degree of civilization.

Bagnacavallo (bàn-yà-k å-v å l'l ō), BARTOLOMMEO RAMENGHI, Italian painter, born in 1484; died in 1542. Called Bagnacavallo from the village where he was born. At Rome he was a pupil of Raphael, and assisted in decorating the gallery of the Vatican.

Bagnara (bà-nyă'rà), a seaport near the s. w. extremity of Italy. Pop. 7568.

Bagnères de Bigorre (bàn-yār dė bē-gorr), a watering-place in France, department of Hautes Pyrénées, on the left bank of the Adour. It owes celebrity to its baths,

which are sulphurous and saline, but it has also manufacturing and other industries. Pop. (1906) 6661.

Bagnères de Luchon (bàn-yār dė lü-shōn), a town in France, department Haute Garonne, in a valley surrounded by wooded hills, one of the principal watering-places of the Pyrenees, having sulphurous thermal waters, said to be beneficial in rheumatic complaints. Resident pop. 3260.

Bagpipe (bag'pīp), a musical wind-instrument of very great antiquity, having been used among the ancient Greeks, and being a favorite instrument over Europe generally in the fifteenth century. It still continues in use among the country people of Poland, Italy, the south of France, and in Scotland and Ireland. Though now often regarded as the national instrument of Scotland, especially Celtic Scotland, it is only Scottish by adoption, having been introduced into that country from England. It consists of a leathern bag, which receives the air from the mouth, or from bellows; and of pipes, into which the air is pressed from the bag by the performer's elbow. In the common or Highland form one pipe (called the *chanter*) plays the melody; of the three others (called *drones*) two are in unison with the lowest A of the chanter, and the third and longest an octave lower, the sound being produced by means of reeds. The chanter has eight holes, which the performer stops and opens at pleasure, but the scale is imperfect and the tone harsh. There are several species of bagpipes, as the soft and melodious Irish bagpipe, supplied with wind by a bellows, and having several keyed drones; the old English bagpipe (now no longer used); the Italian bagpipe, a very rude instrument, etc.

Bagration (bàg-rä'tyōn), PETER, PRINCE, a distinguished Russian general, descended from a noble Georgian family. He was born in 1765, entered the Russian service in 1783, and was constantly engaged in active service till he was mortally wounded at the battle of Borodino, Sept. 7, 1812.

Bagshot Sand, in geology the collective name for a series of beds of siliceous sand, occupying extensive tracts round Bagshot, in Surrey, and in the New Forest, Hampshire, the whole reposing on the London clay; generally devoid of fossils.

Ba'haism, the modern development of Babism. See *Babism.*

Bahama (ba-hā'ma) ISLANDS, or LUCAYOS (lö-kī'os), a group of islands in the West Indies, forming a colony belonging to Britain, lying N. E. of Cuba and S. E. of the coast of Florida, the gulf stream passing between them and the mainland. They extend a distance of upwards of 600 miles, and are said to be twenty-nine in number, besides keys and rocks innumerable. The principal islands are Grand Bahama, Great and Little Abaco, Andros Islands, New Providence, Eleuthera, San Salvador, Great Exuma, Watling Island, Long Island, Crooked Island, Acklin Island, Mariguana Island, Great Inagua. Of the whole group, about twenty are inhabited, the most populous being New Providence, which contains the capital, Nassau, the largest being Andros, 100 miles long, 20 to 40 broad. They are low and flat, and have in many parts extensive forests. Total area, 5450 sq. miles. The soil is a thin but rich vegetable mold, and the principal product is pineapples, which form the most important export. Other fruits are also grown, with cotton, sugar, maize, yams, groundnuts, cocoa-nuts, etc. Sponges are obtained in large quantity and are exported. The islands are a favorite winter resort for those afflicted with pulmonary diseases. Watling Island is now by best authorities believed to be same as Guanahani, the land first touched on by Columbus (October 12, 1492), on his first great voyage of discovery. The first British settlement was made on New Providence towards the close of the seventeenth century. A number of Americans loyal to England settled in the islands after the war of independence. Pop. 53,735, largely negroes.

Bahar (ba-hār'), or BARRE, an East Indian measure of weight, varying considerably in different localities and in accordance with the substances weighed, the range being from 223 to 625 lbs.

Bahawalpur (bà-hà-wàl-pur'), a town of India, capital of state of same name in the Punjab, 2 miles from the Sutlej; surrounded by a mud wall and containing the extensive palace of the Nawab. Pop. (1911) 18,546. The state has an area of 15,000 sq. miles, of which 10,000 is desert, the only cultivated lands lying along the Indus and Sutlej. Pop. 720,700.

Bahia (bà-ē'à; formerly *San Salvador*), a town of Brazil, on the Bay of All Saints, province of Bahia. It consists of a lower town, which is little more than an irregular, narrow, and dirty street, stretching about 4 miles along the shore; and an upper town, with which it is connected by a steep street, much

better built. The harbor is one of the best in South America; and the trade, chiefly in sugar, cotton, coffee, tobacco, hides, piassava, and tapioca, is very extensive. Pop. about 290,000. The State

of Bahia, area 164,601 square miles, pop. in 1920, 3,344,437, has much fertile land, both along the coast and in the interior; capital, San Salvador.

Bahr (bär), an Arabic word signifying sea or large river; as in Bahr-el-Huleh, the Lake Merom in Palestine; Bahr-el-Abiad, the White Nile, Bahr-el-Azrek, the Blue Nile, which together unite at Khartoum.

Bahraich (bä-rīch′), a flourishing town of India, in Oudh, a place of great antiquity. Pop. about 25,000.

Bahrein (bä-rān′) ISLANDS, a group of islands in the Persian Gulf, in an indentation on the Arabian coast. The principal island, usually called Bahrein, is about 27 miles in length and 10 in breadth. The principal town is Manameh or Manama; pop. about 25,000. The Bahrein Islands are chiefly noted for their pearl-fisheries, which were known to the ancients.

Bahr-el-Ghazal (bäh-el-gä-zäl′), a large river of Central Africa, a western tributary of the White Nile.

Baiadeer. See *Bayadere.*

Baiæ (bī′ē), an ancient Roman watering-place on the coast of Campania, 10 miles west of Naples. Many of the wealthy Romans had country houses at Baiæ, which Horace preferred to all other places. Ruins of temples, baths, and villas still attract the attention of archæologists.

Baikal (bī′kal), a large fresh-water lake in Eastern Siberia, 360 miles long, and about 50 in extreme breadth, interspersed with islands; lon. 104° to 110° E.; lat. 51° 20′ to 55° 20′ N. It is surrounded by rugged and lofty mountains; contains seals, and many fish, particularly salmon, sturgeon, and pike. Its greatest depth is over 4000 feet. It receives the waters of the Upper Angara, Selenga, Barguzin, etc., and discharges its waters by the Lower Angara. It is frozen over in winter.

Baikie (bā′ke), WILLIAM BALFOUR, born in the Orkney Islands 1824, died at Sierra Leone 1864. He joined the British navy, and was made surgeon and naturalist of the Niger expedition, 1854. He took the command on the death of the senior officer, and explored the Niger for 250 miles. Another expedition, which started in 1857, passed two years in exploring, when the vessel was wrecked, and all the members, with the exception of Baikie, returned to England. With none but native assistants he formed a settlement at the confluence of the Benué and the Niger, in which he was ruler, teacher, and physician, and within a few years he opened the Niger to navigation, made roads, established a market, etc.

Bail (bāl), the person or persons who procure the release of a prisoner from custody by becoming surety for his appearance in court at the proper time; also, the security given for the release of a prisoner from custody.

Bailen (bī-len′), a town of s. Spain, prov. Jaen, with lead mines. Pop. 7420.

Bailey (bā′li), the name given to the courts of a castle formed by the spaces between the circuits of walls or defenses which surrounded the keep.

Bailey, LIBERTY H., an American botanist, born in 1858, professor of horticulture at Michigan Agricultural College in 1885, at Cornell 1888, director of College of Agriculture there in 1903. Edited *Cyclopedia of American Horticulture, Rural Science, Rural Text-Book* series, *Cyclopedia of Agriculture,* etc. Author of *The Survival of the Unlike, Evolution of Our Native Fruits,* etc.

Bailey, or BAILY, NATHANIEL, an English lexicographer, a school teacher at Stepney, and author of several educational works. His dictionary, published in 1721, passed through a great many editions.

Bailey, PHILIP JAMES, an English poet, born at Nottingham, in 1816, and called to the bar in 1840. Published *Festus,* his best work, in 1839; *The Mystic,* 1855; *The Age,* 1858; and

The Universal Hymn, 1867. He died in 1902.

Bailie, Baillie (bā'li), a municipal officer or magistrate in Scotland, corresponding to an *alderman* in England. The criminal jurisdiction of the provost and bailies of royal burghs extends to breaches of the peace, drunkenness, adulteration of articles of diet, thefts not of an aggravated character, and other offenses of a less serious nature.

Bailiff (bā'lif), a civil officer or functionary, subordinate to some one else. There are several kinds of bailiffs, whose offices widely differ, but all agree in this, that the keeping or protection of something belongs to them. In England the sheriff is the monarch's bailiff, and his county is a bailiwick. The name is also applied to the chief magistrates of some towns, to keepers of royal castles, as of Dover, to persons having the conservation of the peace in hundreds and in some special jurisdictions, as Westminster, and to the returning-officers in the same. But the officials commonly designated by this name are the *bailiffs* of sheriffs, or sheriffs' officers, who execute processes, etc. *Bailiwick* represents the limits of a bailiff's authority.

Bailleul (bà-yeul), an ancient French town, department of Nord, near the Belgian frontier, about 19 miles west of Lille. Has manufactures of woolen and cotton stuffs, lace, leather, etc. Pop. 11,900. A village of same name in dep. Orne gave its name to the Baliol family.

Baillie (bā'lē), JOANNA, a Scottish authoress, born at Bothwell, Lanarkshire, in 1762; died at Hampstead in 1851. She removed in early life to London, where in 1798 she published her first work, entitled *A Series of Plays*, in which she attempted to delineate the stronger passions by making each passion the subject of a tragedy and a comedy. Other volumes followed and also a volume of miscellaneous poetry, including songs. Her only plays performed on the stage were a tragedy entitled the *Family Legend*, brought out at Edinburgh under the patronage of Sir Walter Scott; and *De Montfort*, brought out by John Kemble.

Baillie, MATTHEW, physician and anatomist, brother of the preceding, was born in 1761 at Shotts, Lanarkshire; died at Cirencester, Gloucestershire, in 1823. In 1773 he was placed at the University of Glasgow. He afterwards studied anatomy under his maternal uncles John and William Hunter, and entered Oxford, where he was graduated as M.D. In 1783 he succeeded his uncle as lecturer on anatomy in London, where he acquired a high reputation as a teacher and demonstrator, having also a large practice. In 1810 he was appointed physician to George III. His work on *The Morbid Anatomy of Some of the Most Important Parts of the Human Body* gave him a European reputation.

Baillie, ROBERT, an eminent Scottish Presbyterian clergyman, was born at Glasgow in 1609; died in 1662. Though educated and ordained as an Episcopalian, he resisted the attempt of Archbishop Laud to introduce his Book of Common Prayer into Scotland and joined the Presbyterian party, and in 1640 he was selected to go to London, with other commissioners, to prepare charges against Archbishop Laud for his innovations upon the Scottish Church, and was subsequently appointed professor of divinity at Glasgow. He was a man of profound learning, wrote a number of theological works, and his letters and journal are of great value for the history of his time.

Baillie, ROBERT, of Jerviswood, in Lanarkshire, a Scottish patriot of the reign of Charles II. In 1683 he went to London in furtherance of a scheme of emigration to South Carolina as being the only way of escaping the tyranny of the government. He became associated with Monmouth, Sydney, Russell, and the rest of that party, and was charged with complicity in the Rye-house plot. He was condemned without evidence and executed in December, 1684.

Bailly (bà-ye), JEAN SYLVAIN, French astronomer and statesman, born at Paris, in 1736. After some youthful essays in verse, he was induced by Lacaille to devote himself to astronomy, and on the death of the latter in 1753, being admitted to the Academy of Sciences, he published a reduction of Lacaille's observations on the zodiacal stars. In 1764 he competed ably but unsuccessfully for the Academy prize offered for an essay upon Jupiter's satellites, Lagrange being his opponent; and in 1771 he published a treatise on the light reflected by these satellites. In the meantime he had won distinction as a man of letters by his eulogiums on Pierre Corneille, Leibnitz, Molière, and others; and the same qualities of style shown by these were maintained in his *History of Astronomy* (1775–87), his most extensive work. In 1784 the French Academy elected him a member. The revolution drew him into public life. Paris chose him, May 12, 1789, first deputy of the *tiers-état*, and in the assembly itself he

was made first president, a post occupied by him on June 20, 1789, in the session of the Tennis Court, when the deputies swore never to separate till they had given France a new constitution. As

Jean Sylvain Bailly

mayor of Paris his moderation and impartial enforcement of the law failed to commend themselves to the people, and his forcible suppression of mob violence, July 17, 1791, aroused a storm which led to his resignation and retreat to Nantes. In 1793 he attempted to join Laplace at Melun, but was recognized and sent to Paris, where he was condemned by the revolutionary tribunal, and executed on November 12.

Bailment (bāl'ment), in law, is the delivery of a chattel or thing to a person in trust, either for the use of the bailer or person delivering, or for that of the bailee or person to whom it is delivered. A bailment always supposes the subject to be delivered only for a limited time, at the expiration of which it must be redelivered to the bailer, the responsibility of the bailee being dependent, in some degree, upon the contract on which the bailment is made. Pledging and letting for hire are species of bailment.

Baily (bā'lē), EDWARD HODGES, an English sculptor, born at Bristol about 1788; died in 1867. He studied under Flaxman and at the Royal Academy, where he won the gold and silver medals. His best works include *Eve at the Fountain, Psyche, Hercules Casting Lichas into the Sea,* etc., with statues of Lord Mansfield, Nelson, and other men of note.

Baily, FRANCIS, astronomer, born in Berkshire, in 1774; settled in London as a stockbroker in 1802. While thus actively engaged he published *Tables for the Purchasing and Renewing of Leases,* the *Doctrine of Interest and Annuities,* the *Doctrine of Life Annuities and Assurances,* and an epitome of universal history. On retiring from business with an ample fortune in 1825 he turned his attention to astronomy, became one of the founders of the Astronomical Society, contributed to its *Transactions,* and in 1835 published a life of Flamsteed. He died in 1844.

Baily's Beads, a phenomenon attending eclipses of the sun, the unobscured edge of which appears discontinuous and broken immediately before and after the moment of complete obscuration. It is classed as an effect of irradiation.

Bain (bān), ALEXANDER, writer on mental philosophy and education, was born at Aberdeen in 1818. He was educated at Marischal College, Aberdeen, and after holding minor positions in 1860 was appointed professor of logic and English in Aberdeen University, a post which he held till his resignation in 1881. His most important works are: *The Senses and the Intellect, the Emotions and the Will,* together forming a complete exposition of the human mind; *Mental and Moral Science; Logic, Deductive and Inductive; Mind and Body; Education as a Science; James Mill, a Biography; John Stuart Mill,* besides an *English Grammar, Manual of English Composition and Rhetoric,* etc. He died in 1903.

Bainbridge (bān'brij), WILLIAM, an American naval officer, was born at Princeton, New Jersey, in 1774, entered the navy in 1798, served with distinction against France that year and next; in 1800, as captain, carried tribute to Algiers, where he was humiliated by the dey, and in 1804 he was taken prisoner by the Tripolitans. He served with marked success in the war of 1812. In 1815 he commanded a squadron against Algiers. In 1824–7 he was a member of the Board of Navy Commissioners in Washington. He died in 1833.

Bairam (bī'ram), the Easter of the Mohammedans, which follows immediately after the Ramadan or Lent (a month of fasting), and lasts three days. This feast during the course of thirty-three years makes a complete circuit of all the months and seasons, as the Turks reckon by lunar years. Sixty days after this first great Bairam begins the lesser Bairam. They are the only two feasts prescribed by the Mohammedan religion.

Baird (bārd), SIR DAVID, a distinguished British commander, was born in Edinburghshire in 1757, and entered the

army in 1772. Having been promoted to a lieutenancy in 1778, he sailed for India, distinguished himself as a captain in the war against Hyder Ali, was wounded and taken prisoner, and confined in the fortress of Seringapatam for nearly four years. He and his fellow-prisoners were treated with great barbarity, and many of them died or were put to death, but at last (in 1784) all that survived were set at liberty. Made a major in 1787 and lieutenant colonel in 1791, he commanded a brigade under Cornwallis in the war against Tippoo. Appointed major-general in 1798, he returned to India. In 1799 he commanded the storming party at the assault of Seringapatam, and, in requital, was presented with the state sword of Tippoo Saib. Being appointed in 1800 to command an expedition to Egypt, he landed at Kosseir in June,

Sir David Baird.

1801, crossed the desert, and, embarking on the Nile, descended to Cairo, and thence to Alexandria, which he reached a few days before it surrendered to General Hutchinson. Next year he returned to India, but being soon after superseded by Sir Arthur Wellesley (Wellington), he sailed for Britain, where he was knighted and made K.C.B. With the rank of lieutenant-general he commanded an expedition in 1805 to the Cape of Good Hope, and in 1806, after defeating the Dutch, he received the surrender of the colony. He commanded a division at the siege of Copenhagen, and after a short period of service in Ireland sailed with 10,000 men for Corunna, where he formed a junction with Sir John Moore. He commanded the first division of Moore's army, and in the battle of Corunna lost his left arm. By the death of Sir John Moore Sir David succeeded to the chief command, receiving for the fourth time the thanks of Parliament and a baronetcy. In 1814 he was made a general. He died in 1829.

Baird, SPENCER FULLERTON, naturalist, born at Reading, Pennsylvania, in 1823. He was assistant secretary, and afterwards secretary, of the Smithsonian Institution, Washington, and was also chief government commissioner of fish and fisheries. He wrote much on natural history, his chief works being *The Birds of N. America* (in conjunction with John Cassin); *The Mammals of N. America; Review of American Birds in the Smithsonian Institution;* and (with Messrs. Brewer and Ridgeway) *History of North American Birds.* He died in 1887.

Baireuth (bī-roit'), a well-built and pleasantly-situated town of Bavaria, on the river Main, 41 miles northeast of Nürnberg. The principal edifices, besides churches, are the old and the new palace, the opera-house, the gymnasium, and the national theater, constructed after the design of the composer Wagner, and opened in 1876 with a grand performance of his tetralogy of the Nibelungen Ring. Industries: cotton spinning, sugar refining, musical instruments, sewing-machines, leather, brewing, etc. There is a monument to Jean Paul F. Richter, who died here. Pop. 34,547.

Baius (bī'us), or DE BAY, MICHAEL. Catholic theologian, was born 1513, in Hainaut, educated at Louvain, made professor of theology there in 1563 or 1564, and chosen a member of the Council of Trent. Leaving the scholastic method, he founded systematic theology directly upon the Bible and the Christian fathers, of whom he particularly followed St. Augustine. His doctrines of original sin and of salvation by grace led to his persecution as a heretic by the old Scotists and the Jesuits, who succeeded in obtaining a papal bull in 1567 condemning the doctrines imputed to him. Baius, however, remained in the possession of his dignities, was appointed in 1578 chancellor of Louvain University; he obtained a great name as leader in the anti-scholastic reaction of the 16th century. He died in 1589. His Augustinian views descended to the Jansenists, while his doctrine of pure, undivided love to God formed one of the main distinctions of Quietism.

Baize (bāz), a sort of coarse woolen fabric with a rough nap, now generally used for linings, and mostly green or red in color.

Baja (bo'yo), a market town of Hungary, district of Bacs, on the Danube,

with a trade in grain and wine, and a large annual hog fair. Pop. 20,361.

Bajaderes. See *Bayaderes.*

Bajazet (bà-yà-zet'), or BAYASID, I, a Turkish emperor. In 1389, having strangled his brother Jacob, he succeeded his father Murad or Amurath, who fell in the battle of Cassova against the Servians. From the rapidity of his conquests he received the name of *Ilderim*, the Lightning. In three years he subjected Bulgaria, part of Servia, Macedonia, Thessaly, and the states of Asia Minor, and besieged Constantinople for ten years, defeating Sigismund and the allied Hungarians, Poles, and French, in 1395. The attack of Timur (Tamerlane) on Natolia, in 1400, saved the Greek Empire, Bajazet being defeated and taken prisoner by him near Ancyra Galatia, in 1402. The story of his being carried about in a cage by Timur is improbable; but Bajazet died in 1403, in Timur's camp, in Caramania. His successor was Soliman I.

Bajazet II succeeded his father, Mohammed II, sultan of the Turks, in 1481. He increased the Turkish Empire by conquests on the N. W. and in the E., took Lepanto, Modon, and Durazzo in a war against the Venetians, and ravaged the coasts of the Christian states on the Mediterranean, to revenge the expulsion of the Moors from Spain. Having abdicated in favor of his younger son Selim, he died on his way to a residence near Adrianople in 1513. He did much for the improvement of his empire and the promotion of the sciences.

Bajocco, or BAIOCCO (bà-yok'o), was a copper coin in the Papal States, the hundredth part of a scudo, or rather more than a halfpenny. The name was also given in Sicily to the Neapolitan *grano*, the hundredth part of the ducato 80 cts.

Bajus. See *Baius.*

Bajza (boi'za), JOSEPH, Hungarian lyric poet, historian, and critic born in 1804; died in 1858. As contributor and editor of various periodicals he played an important part in the development of modern Hungarian literature and drama. A volume of his poems, of high merit, was published in 1835. He also translated a collection of foreign dramas, and edited a series of historical works.

Bakalahari (bà-kà-là-hà'ri), a Bechuana tribe inhabiting the Kalahari Desert, South Africa.

Bakarganj (bäk-ur-gunj'), a maritime district and town in Bengal; chief rivers: Ganges, Brahmaputra, and Meghna. Area, 3649 sq. miles. Pop. 2,154,000. The town lies in ruins.

Bakau (bä'kou), a town of Roumania, on the Bistritza. Pop. 16,187.

Bakchisarai (bâk-chi-sâ-rī'), or BAGTCHESERAI (bäg-che-se-rī'; Turkish, 'Garden Palace'), an ancient town of Russia, in the Crimea, picturesquely situated at the bottom of a narrow valley, hemmed in by precipices. It contains the palace of the ancient Crimean khans. Pop. 16,000.

Bakelite (bā'ke-līt), a substance first produced in the United States (under the direction of Dr. L. H. Baekeland) from the chemical union of phenols and formaldehyde. It is an amber-like substance with high electrical insulating properties and great strength, is insoluble in all known solvents and resists most chemicals. It does not melt at 300° C. or over, though at higher temperatures it chars and burns. Before assuming its final form bakelite is a liquid which solidifies under heat, and is used to impregnate coils for dynamos, to harden wood and other porous bodies, etc. Transparent bakelite is used for pipe stems, jewelry and other articles for which inflammable celluloid was formerly employed. It is sometimes compounded with asbestos or wood pulp, and is also used as a varnish. The chemical name for this substance is oxybenzyl-methylen-glycolanhydride.

Baker, NEWTON DIEHL, Secretary of War under President Wilson (Second Term), was born in Martinsburg, Virginia, and educated at Johns Hopkins University (1892) and Washington and Lee University. He was admitted to the bar in West Virginia in 1894. In 1897, he removed to Cleveland, Ohio, and in 1902 was elected City Solicitor, holding this office until 1912. He was a prominent figure in the successful fight for three-cent trolley fares. In 1911 he was elected Mayor of Cleveland, serving until 1915. In 1916 he entered the Cabinet, succeeding Lindley M. Garrison, and supported the legislation which resulted in the Selective Service Law. See *Conscription.*

Baker, SIR SAMUEL WHITE, a distinguished English traveler, born in 1821. He resided some years in Ceylon; in 1861 began his African travels, which lasted several years, in the Upper Nile regions, and resulted, among other discoveries, in that of Albert Nyanza in 1864, and of the exit of the White Nile from it. He returned in 1873, having finished his work, and was succeeded by the celebrated Gordon. His writings include: *The Rifle and the Hound in Ceylon; Eight*

Years' Wanderings in Ceylon; The Albert Nyanza, etc. The Nile Tributaries of Abyssinia. He died Dec. 30, 1893.—His brother, Valentine (1827-87), known as Baker Pasha, an English soldier; fought in the Kaffir and Crimean wars. In 1882 he took command of the Egyptian gendarmerie. Was defeated by Osman Digna in 1884. He wrote *Clouds in the East and The War in Bulgaria*, etc.

Baker, THOMAS (1656-1740), an English antiquary and author. He wrote *Reflections on Learning*, and a history of St. John's College.

Baker, a city, county seat of Baker Co., Oregon, on Powder River; in a gold, silver and copper, agricultural and stock-raising district. It has lumber mills and box factories, machine shops, foundry, flouring mills, calendar and post-card factories, cigar factories, railroad shops, etc. Pop. (1920) 7729.

Bakersfield, a city, the county seat of Kern Co., California, on the Kern River, 300 miles S. E. of San Francisco. It is a shipping point for produce, and has oil refineries, fruit-packing works, carshops, etc. Pop. 18,638.

Bakewell (bāk'wel), an ancient market-town, England, county of Derby, between Buxton and Matlock, possessing a fine Gothic church, a chalybeate spring, a cotton-mill erected by Arkwright, and a large marble-cutting industry. Pop. 3078.

Bakewell, ROBERT, an English agriculturist, celebrated for his improvements in the breeding of sheep, cattle, and horses, was born in Leicestershire in 1725, and died in 1795. He was the originator of the Leicestershire breed of sheep, which have since been so well known, and also of a breed of cattle that had great repute in their day. Various improvements in farm management were also introduced by him.

Bakhmut (bak-möt'), a town of Russia, 25 miles E. of Yekaterinoslap; here are large deposits of salt and coal. Pop. 20,000.

Bakhuisen. See *Backhuysen.*

Baking (bāk'ing), a term used in various senses. For the baking of bread, see *Bread.* A common application of the term is to a mode of cooking food in a close oven, baking in this case being opposed to roasting or broiling, in which an open fire is used. The oven should not be too close, but ought to be properly ventilated. Baking is also applied to the hardening of earthenware or porcelain by fire.

Baking Powder, a mixture of bicarbonate of soda and tartaric acid, usually with some flour added. The water of the dough causes the liberation of carbonic acid, which makes the bread 'rise.'

Bakony Wald (bå-kon'yé), a thickly-wooded mountain range dividing the Hungarian plains, famous for the herds of swine fed on its mast.

Bakshish (bak-shish'), an Eastern term for a present or gratuity. A demand for bakshish meets travelers in the East everywhere from Turkey and Egypt to Hindustan.

Baku (bä-kö'), a Russian port on the western shore of the Caspian, occupying part of the peninsula of Apsheron. The naphtha or petroleum springs of Baku have long been known; and the 'Field of Fire,' so called from emitting inflammable gases, has long been a place of pilgrimage with the Guebres or Fire-worshipers. Recently, from the development of the petroleum industry, Baku has greatly increased, and is now a large and flourishing town. Over 1500 oil-wells are in operation, producing immense quantities of petroleum, much of which is led direct in pipes from the wells to the refineries in Baku. Some of the wells have had such an outflow of oil as to be unmanageable, and the Baku petroleum now competes successfully with any other in the markets of the world, more than 60,000,000 barrels being produced annually. This is a falling off since 1901, when 85,000,000 barrels were produced. It is a heavy product, yielding a small percentage of burning oil, but the cheapness of the crude oil enables it to be refined profitably, since the remaining material can be sold for fuel. Baku was the station of the Caspian fleet. During the war on the Russian Bolsheviki troops, 1918-21 (see *Russia*), it changed hands several times. Pop. 237,000.

Bakunin (bå-kū'nēn), MICHAEL, a Russian anarchist, reputed founder of Nihilism, born 1814 of a noble family, entered the army, but threw up his commission after two years' service, and studied philosophy at Moscow, with his friends Herzen, Turgenieff, Granowski (historian), and Belinski (critic). Having adopted Hegel's system as the basis of a new revolution, he went in 1841 to Berlin, and thence to Dresden, Geneva, and Paris, as the propagandist of anarchism. Wherever he went he was influential for disturbance, and after undergoing imprisonment in various states, was handed over to Russia in 1851 by Austria, imprisoned for five years, and finally sent to Siberia. Escaping thence through Japan, he joined Herzen in Lon-

don on the staff of the *Kolokl.* His extreme views and violent tendencies finally led to a quarrel with Marx and the International; and having fallen into disrepute with his own party in Russia, he died suddenly and almost alone at Berne, in 1876. He demanded the entire abolition of the state, the absolute equalization of individuals, and the extirpation of hereditary rights and of religion, his conception of the next stage of social progress being purely negative and annihilatory.

Bala (ba'la), a lake 4 miles long, and a small town of N. Wales, in Merionethshire.

Balaam (bā'lam), a heathen seer, invited by Balak, King of Moab, to curse the Israelites, but compelled by miracle to bless them instead (Numbers, xxii–xxiv). In another account he is represented as aiding in the perversion of the Israelites to the worship of Baal, and as being, therefore, slain in the Midianitish war (Numbers, xxxi; Joshua, xiii). He is the subject of many rabbinical fables, the Targumists and Talmudists regarding him, as most of the fathers did, in the light of an impious and godless man.

Bala Beds, a local deposit, in the Bala district, North Wales, consisting of slates, grits, sandstones, and limestones, there being two limestones separated by sandy and slaty rocks about 1400 ft. thick. They contain trilobites of many species, as well as other fossils. The lower Bala limestone (25 ft. thick) may be traced over a large area in North Wales.

Balachong (bå-lå-chong'), an oriental condiment, composed of small fishes, or shrimps, pounded up with salt and spices and then dried.

Balæna (ba-lē'na), the genus which includes the Greenland or right whale, type of the family Balænidæ, or whalebone whales.

Balæniceps (ba-lē'ni-seps; 'whale-head'), a genus of wading birds belonging to the Soudan, intermediate between the herons and storks, and characterized by an enormous bill, broad and swollen, giving the only known species (*B. rex*), also called shoebird, a peculiar appearance. It feeds on fishes, water snakes, carrion, etc., and makes its nest in reeds or grass adjoining water. The bill is yellow, blotched with dark brown, the general color of the plumage dusky gray, the head, neck, and breast slaty, the legs blackish.

Balænoptera (ba-lē-nop'tér-a), the genus to which the rorqual whale belongs. See *Rorqual.*

Balagarh (bä-lä-gar'), a town of Hindustan in the Punjab. Pop. 11,233.

Balakiref (bä-lä'kī-ref), Mily Alexeivitch, a Russian composer and conductor, born at Nijni-Novgorod, January 2, 1837; died at St. Petersburg, June 24, 1910. He was one of the founders of the new Russian school. His compositions are the symphonic poems, *Thamar*, *Russia*, a symphony, and a collection of Russian folk songs.

Balaklava (bå-lå-klä'vå), a small seaport in the Crimea, 8 miles S. S. E. of Sebastopol. In the Crimean war it was captured by the British in a heroic battle, Oct. 25, 1854.

Balalaika (bå-lā-lī'kå), a musical instrument of very ancient Slavonic origin, common among the Russians and Tartars. It is a narrow, shallow guitar with two to four strings.

Balance (bal'ans), an instrument employed for determining the quantity of any substance equal to a given weight. Balances are of various forms; in that most commonly used a horizontal beam rests so as to turn easily upon a certain point known as the center of motion. From the extremities of the beam, called the center of suspension, hang the scales; and a slender metal tongue midway between them, and directly over the center of motion, indicates when the beam is level. The characteristics of a good balance are: 1st, that the beam should rest in a horizontal position when the scales are either empty or loaded with equal weights; 2d, that a very small addition of weight put into either scale should cause the beam to deviate from the level, which property is denominated the *sensibility* of the balance; 3d, that when the beam is deflected from the horizontal position by inequality of the weights in the scales, it should have a tendency speedily to restore itself and come to rest in the level, which property is called the *stability* of the balance. To secure these qualities the arms of the beam should be exactly similar, equal in weight and length, and as long as possible; the centers of gravity and suspension should be in one straight line, and the center of motion immediately above the center of gravity; and the center of motion and the centers of suspension should cause as little friction as possible. The center of motion ought to be a knife-edge; and if the balance requires to be very delicate, the centers of suspension ought to be knife-edges also. For purposes of accuracy, balances have occasionally means of raising or depressing the center of gravity, of regulating the length of the

THE THIN RED LINE OF BALAKLAVA

This stirring picture shows the gallant siege of the Ninety-third Highlanders at the Battle of Balaklava in the Crimean War. This engagement was fought October 25, 1854, and was the scene of the famous "Charge of the Light Brigade," which Tennyson has immortalized in his poem of that name.

arms, etc., and the whole apparatus is not infrequently enclosed in a glass case, to prevent the heat from expanding the arms unequally or currents of air from disturbing the equilibrium.

Of the other forms of balance, the Roman balance, or *steelyard*, consists of a lever moving freely upon a suspended fulcrum, the shorter arm of the lever having a scale or pan attached to it, and the longer arm, along which slides a weight, being graduated to indicate quantities. In some of its forms it is in use in nearly all parts of the world. A variety of this, the Danish balance, has the weight fixed at the end of the lever, the fulcrum being movable along the graduated index. The *spring-balance* shows the weight of articles by the extent to which they draw out or compress a spiral spring. It is of service where a high degree of exactness is not required, and finds application in the dynamometer for measuring the force of machinery. It is also used in various forms as household scales and among merchants.

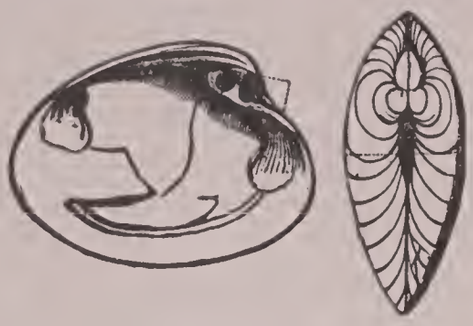
Balance of Power, a political principle which first came to be recognized in modern Europe during the 16th century, though it appears to have been also acted on by the Greeks in ancient times, in preserving the relations between their different states. An equilibrium between the various powers that form the family of nations is essential to the existence of any international law, which is the code of rules established by custom or defined in treaties. The object in maintaining the balance of power is to secure the general independence of nations as a whole, by preventing the aggressive attempts of individual states to extend their territory and sway at the expense of weaker countries. The first European monarch whose ambitious designs induced a combination of other states to counteract them was the Emperor Charles V, similar coalitions being formed in the end of the seventeenth century, when the ambition of Louis XIV excited the fears of Europe, and a century later against the exorbitant power and aggressive schemes of the first Napoleon. More recently still we have the instance of the Crimean war, entered into to check the ambition of Russia. Since then there have been various alliances among the nations, notably the Triple Alliance, comprising Germany, Austria-Hungary and Italy, formed for the object of protection against Russia. From this alliance Italy withdrew during the European war and ranged herself with the foes of her former allies. To counterbalance the Triple Alliance King Edward VII of England helped to form the now famous Triple Entente, among England, France, and Russia.

Balance of Trade, the difference between the stated money values of the exports and imports of a country. The balance is erroneously said to be 'in favor' of a country when the value of the exports is in excess of that of the imports and 'against it' when the imports are in excess of the exports. The phrases date from the days of the mercantile system, the characteristic doctrine of which alleged the desirability of regulating commerce with a view of amassing treasure by exporting produce largely, importing little merchandise in return, and receiving the balance in bullion. In certain conceivable political and industrial conditions this may have had beneficial results; but its importance was greatly overestimated, and the state of this balance came to be regarded as an invariable criterion of the industrial condition of a country. The false analogy of the successful merchant who gains more than he spends became the basis of popular reasoning, the products of a country being mistakenly identified with its exports, its consumption with its importation. It is now generally recognized that if bullion be exported from a country it is because it is at the time the cheapest commodity available for export; and further, that there are certain natural limits to its undue exportation, in that the increased scarcity of money is attended with a fall in the money-value of other commodities, which thus in turn become preferable objects of exportation, while bullion flows back. The excess of the value of imports over that of exports, which is regarded by some as an adverse and alarming symptom in British trade, is in large part readily accounted for on the ground of shipping receipts, insurance returns, interest on capital, employment in foreign trade, merchants' profits, and the income derived from foreign investments.

Balanoglossus (bal-an-o-glos'us), a worm-like animal of much interest from its seeming to form a link between the vertebrates and invertebrates. It is a very soft-bodied creature, which lives in fine sand, which it appears to saturate with slime. Four species of its genus are known, their interesting feature being a structure which some look upon as the primitive aspect of the dorsal nerve chord, and the supporting axis of vertebrates. It has also gill slits like those of vertebrates.

Balanus (bal'a-nus; 'acorn-shells'), a genus of sessile cirripeds, family Balanidæ, of which colonies are to

be found on rocks at low water, on timbers, crustaceans, shells of mollusca, etc. They differ from the barnacles in having a symmetrical shell, and being destitute of a flexible stalk. The shell consists of



Balanus Shells.

six plates, with an operculum of four valves. They pass through a larval state in which they are not fixed, moving by means of swimming feet which disappear in the final state. All the Balanidæ are hermaphrodite. A South American species (*Balănus psittăcus*) is eaten on the coast of Chile, the *Balanus tintinnabŭlum* by the Chinese. The old Roman epicures esteemed the larger species.

Balapur (bà-là-pūr′), town of India in Akola district, Berar, with strong fort and fine pavilion of black stone. Pop. about 10,000.

Balas (bal′as), a name used to distinguish the rose-colored species of ruby from the ruby proper.

Balasor (bal-a-sōr′), a seaport town, Hindustan, presidency of Bengal, province of Orissa, headquarters of a district and subdivision bearing the same name. It carries on a considerable traffic with Calcutta. Pop. about 20,000.

Balata (ba-la′ta), a gum yielded by *Mimūsops Balata*, a tree growing abundantly in British, French, and Dutch Guiana, Honduras and Brazil, obtained in a milky state by 'tapping' the tree, and hardening to a substance like leather. Used for similar purposes to India rubber. Owing to its strength it is much used in the manufacture of belting.

Balaton (bo′lo-ton), or PLATTENSEE (plåt-tin-zā′), a lake of Hungary, 55 miles S. W. of Pesth; length, 50 miles; breadth, 3 to 7½ miles; area, about 226 square miles. Of its 32 feeders the Szala is the largest, and the lake communicates with the Danube by the rivers Sio and Sarviz. It abounds with a species of perch.

Balbec. See *Baalbek*.

Balbi (bål′bē), ADRIEN, geographer and statistician, born at Venice in 1782. In 1808 his first work on geography procured his appointment as professor of geography in the College of San Michele at Murano, and he became in 1811 professor of natural philosophy in the Lyceum at Fermo. In 1820 he proceeded to Portugal, and collected there materials for his *Essai Statistique sur le Royaume de Portugal et d'Algarve* and *Variétés Politiques et Statistiques de la Monarchie Portugaise*, both published in 1822 at Paris, where he resided till 1832. He then settled in Padua, where he died in 1848. Balbi's admirable *Abrégé de Géographie* was written at Paris, and translated into the principal European languages.

Balbi, GASPARO, a Venetian dealer in precious stones, born about the middle of the sixteenth century, who traveled first to Aleppo and thence down the Euphrates and Tigris to the Malabar coast, sailing finally for Pegu, where he remained for two years. His *Viaggio nelle Indie Orientali*, published on his return to Venice in 1590, contains the earliest account of India beyond the Ganges.

Balbo (bål′bo), CESARE, Italian author and statesman, born in 1789 at Turin. After holding one or two posts under the patronage of Napoleon, he devoted himself to history, publishing a history of Italy prior to the period of Charlemagne, a compendium of Italian history, etc. His *Speranze d' Italia* (1843), a statement of the political condition of Italy, and of the practicable ideals to be kept in view, gave him a wide reputation. He died in 1853.

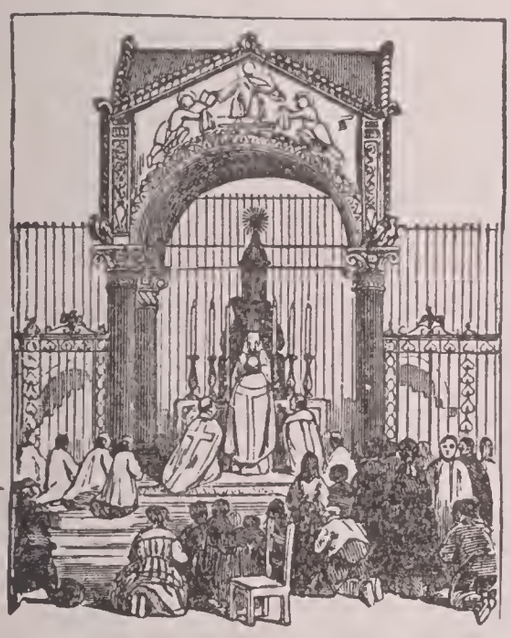
Balboa (bal-bō′a), VASCO NUÑEZ DE, one of the early Spanish adventurers in the New World; born in 1475. Having dissipated his fortune, he went to America, and was at Darien with the expedition of Francisco de Enciso in 1510. An insurrection placed him at the head of the colony, but rumors of a western ocean and of the wealth of Peru led him to cross the isthmus. On Sept. 25, 1513, he saw for the first time the Pacific, and after annexing it to Spain, and acquiring information about Peru, returned to Darien. Here he found himself supplanted by a new governor, Pedrarias Davila, with much consequent grievance on the one side and much jealousy on the other. Balboa submitted, however, and in the following year was appointed viceroy of the South Sea. Davila was apparently reconciled to him, and gave him his daughter in marriage, but shortly after, in 1517, had him beheaded on a charge of intent to rebel. Pizarro, who afterwards completed the discovery of Peru, served under Balboa.

Balbriggan (bal-brig′gan), a seaport and favorite watering-

place, of Ireland, county of Dublin; celebrated for its hosiery. Pop. 2200.

Balcony (bal'kō-ni), in architecture, is a gallery projecting from the outer wall of a building, supported by columns or brackets, and surrounded by a balustrade. Balconies were not used in Greek and Roman buildings, and in the East the roof of the house has for centuries served similar purposes on a larger scale. Balconies properly so styled came into fashion in Italy in the middle ages, and were apparently introduced into Britain in the sixteenth century.

Baldachin (bal'da-kin; It. *baldacchino*), a canopy or tent-like covering of any material, either suspended from the roof, fastened to the wall, or supported on pillars over altars, thrones, pulpits, beds, portals, etc. Portable baldachins of rich materials were formerly used to shield the heads of dignitaries in processions, and are still so used in the processions of the Catholic Church and in the East. The enormous bronze baldachin of Bernini placed over the tomb of the apostles in St. Peter's at Rome is one of the most famous, though surpassed in beauty by many in other European cathedrals and churches.



Baldachin, Church of S. Ambrose, Milan.

Balder, or BALDUR (bal'der, bal'dör), a Scandinavian divinity, represented as the son of Odin and Frigga, beautiful, wise, amiable, and beloved by all the gods. His mother took an oath from every creature, and even from every inanimate object, that they would not harm Balder, but omitted the mistletoe. Balder was therefore deemed invulnerable, and the other gods in sport flung stones and shot arrows at him without harming him. But the evil god Loki fashioned an arrow from the mistletoe and got Balder's blind brother Höder to shoot it, himself guiding his aim. Balder fell dead, pierced to the heart, to the deep grief of all the gods. He is believed to be a personification of the brightness and beneficence of the sun. See *Northern Mythology*.

Baldi (bal'de), BERNARDINO, mathematician, theologian, geographer, historian, poet, etc., born at Urbino, in 1533; studied at Padua; became abbot of Guastalla. He knew upwards of twelve languages, and is said to have written over a hundred works, most of which remain in MS. His works include a poem on navigation, various translations and commentaries, *Lives of Celebrated Mathematicians*, etc. He died in 1617.

Bald'ness, loss of the hair, complete or partial, usually the latter, and due to various causes. Most commonly it results as one of the changes belonging to old age, due to wasting of the skin, hair sacs, etc. It may occur as a result of some acute disease or at an unusually early age without any such cause. In both the latter cases it is due to defective nourishment of the hair, owing to lessened circulation of the blood in the scalp. The best treatment for preventing loss of hair seems to consist in such measures as bathing the head with cold water and drying it by vigorous rubbing with a rough towel and brushing it well with a hard brush. Various stimulating lotions are also recommended, especially those containing cantharides. But probably in most cases senile baldness is unpreventable. When extreme scurfiness of the scalp accompanies loss of the hair an ointment that will clear away the scurf will prove beneficial.

Baldovinetti (bal-do-ve-net'tē), ALESSIO, a Florentine artist, born in 1427. Few of his works remain: an *Annunciation* in the cloister of the Annunziata, a *Nativity* in the cathedral, and an altar-piece preserved in the Academy at Florence. He was believed to have rediscovered the art of mosaic. Died in 1499.

Baldric (bald'rik), a broad belt formerly worn over the right or left shoulder diagonally across the body, often highly decorated and enriched with gems, and used to sustain the sword, dagger, or horn; also for purposes of ornament, and as a military or heraldic symbol.

Baldung, HANS, or HANS GRÜN (grün), German painter and wood engraver, born in Swabia in 1470; died in Strasburg in 1545. His work, though inferior to Dürer's, possessed many of the

same characteristics, and on this account he has been sometimes considered a pupil of the Nuremberg master.

Baldwin (bald'win), ABRAHAM (1754-1807), an American statesman, born at Guilford, Conn., settled at Savannah, Ga., planned and was first president of University of Georgia, 1786-1801; delegate to Continental Congress and member of Constitutional Convention at Philadelphia, 1787. He was member of Congress from Georgia, 1789-99, and United States senator, 1799-1807, serving as president pro tem, 1801-02.

Baldwin, CHARLES H. (1822-88), an American naval officer, born in New York. He served in the Mexican war, and commanded the *Clifton* in the mortar fleet under Farragut at New Orleans, 1862. He was appointed rear-admiral in 1883.

Baldwin, CHARLES SEARS, an American educator and author, born in New York in 1867. He was professor of rhetoric and English composition at Columbia University from 1911. Author of *The English Bible as a Guide to Writing*, *Essays Out of Hours*, *College Composition*, etc.

Baldwin, EVELYN BRIGGS, an American explorer, born at Springfield, Mo., in 1862. He was principal of high school and superintendent of city schools in Kansas, 1887-91, and was observer in the U. S. Weather Bureau, 1892-1900. He accompanied Peary to North Greenland in 1893-94, and was with the Wellman expedition to Franz-Joseph-Land 1898-99. He organized and led the Baldwin-Ziegler polar expedition of 1901-02.

Baldwin, HENRY (1780-1844), an American jurist, born at New Haven, Conn., practiced law in Pittsburgh, Pa., member of Congress from Pennsylvania, 1817-22; associate justice of U. S. Supreme Court from 1830.

Baldwin, JAMES MARK, an American psychologist, born at Columbia, S. C., in 1861, graduated from Princeton University, where he became instructor in French and German; professor of philosophy at Lake Forest (Illinois) University, 1887-89; professor of philosophy at University of Toronto, 1889-93. He was later professor of philosophy and psychology at Johns Hopkins, and honorary professor at the National University of Mexico.

Baldwin, JOSEPH G. (1815-64), an American jurist and humorist, born in Sumter, Alabama. Author of *Flush Times in Alabama and Mississippi* and *Party Leaders*.

Baldwin, MATTHIAS WILLIAM (1795-1866), an American manufacturer of steam-engines, born at Elizabethtown, N. J. He built the first locomotive, 'Ironsides,' for the Philadelphia and Germantown Railway in 1832, and founded the great Baldwin Locomotive Works of Philadelphia.

Baldwin, ROBERT (1804-58), a Canadian statesman, born at Toronto (then called York), educated at public schools and became a lawyer. He was solicitor-general for Upper Canada in 1841 in the first ministry under the Union, and with Louis Hippolyte La Fontaine led the administration of 1842-43 and 1848-51.

Baldwin, SAMUEL ATKINSON, an American musician, born at Lake City, Minn., January 25, 1862. He was organist of Plymouth Church, Chicago, 1885-89, and director of choral societies in St. Paul and Minneapolis from 1885 to 1895. Later he went to New York and succeeded Dudley Buck as organist of Holy Trinity. In 1907 he became professor of music and organist of the College of the City of New York.

Baldwin, SIMEON EBEN, an American jurist and educator, born at New Haven, Conn., in 1840, graduated at Yale in 1861, admitted to the bar in 1863, and was professor of law at Yale from 1872. In 1893 he became associate judge of the Connecticut Supreme Court of Errors, and in 1907-10 was chief justice. He was governor of Connecticut in 1911-13, and in 1913-15.

Baldwin, STANLEY, an English businessman and prime minister of Great Britain, born August 3, 1867, educated at Harrow and Cambridge. He had large iron, coal, and railway interests, and his intimate knowledge of big business made him of great usefulness as private secretary to Bonar Law (q. v.) who was chancellor of the exchequer for the coalition government during the European war. He was financial secretary of the treasury from 1917 to 1921, and in the latter year became a member of Lloyd George's cabinet as president of the Board of Trade. He became chancellor of the exchequer in Bonar Law's administration, 1922, and when Law resigned in May, 1923, Stanley Baldwin became prime minister. As chancellor he headed the British commission to the United States to arrange for the settlement of the debt. In 1892 he married Lucy Ridsdale, daughter of E. L. J. Ridsdale, of Rottingdean.

Baldwin, WILLIAM HENRY (1863-1905), an American railway official, born in Boston, Mass., grad-

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STANLEY BALDWIN

The first representative of "Big Business" to become prime-minister of Great Britain. Prior to his elevation to the premiership, he made acquaintance with America as head of the British financial mission which came to Washington to arrange for a settlement of the war debt.

uated at Harvard, 1885. He began his railroad career as a clerk in the Omaha auditor's office of the Union Pacific Railway; in 1888 he was assistant general freight agent, and president of the Montana Union Railroad in 1889. From 1896 until his death he was president of the Long Island Railroad. He was associated with numerous reform movements, and in educational work in the South.

Baldwin I, Emperor of Constantinople, founder of the short-lived dynasty of Latin sovereigns of the Eastern empire, was born in 1172, and was hereditary Count of Flanders and Hainault. His courage and conduct in the fourth crusade led to his unanimous election as Emperor of the East after the capture of Constantinople by the French and Venetians in 1204. In the absence of Baldwin's brother with a large part of the army, the Greeks rose in revolt under the instigation of Joannices, King of Bulgaria. Baldwin marched on Adrianople, but was taken prisoner and died in captivity, 1206. Baldwin was succeeded by his brother Henry.—BALDWIN II, fifth and last Latin Emperor of Constantinople, was born in 1217. During his minority John de Brienne was regent, but on his assuming the power himself the empire fell to pieces. In 1261 Constantinople was taken by the forces of Michael Palæologus, and Baldwin retired to Italy, dying in 1273.

Baldwin I, King of Jerusalem, reigned 1100–18, having assumed the title which his elder brother Godfrey de Bouillon had refused. He subdued Cæsarea, Ashdod, Tripolis, and Acre.—BALDWIN II, his nephew and successor, reigned 1118–31. During his reign the reduction of Tyre and the institution of the order of Templars took place.—BALDWIN III, King of Jerusalem from 1143 to 1162, was son and successor of Foulques of Anjou, and the embodiment of the best aspects of chivalry. After defeating Noureddin in 1152, and again in 1157, he was enabled to devote himself to the hopeless task of improving the kingdom and establishing the Christian chivalry in the East. He died in 1162 and was succeeded by his brother Amalric I.

Bâle (bäl). See *Basel.*

Bale (bāl), JOHN, an English ecclesiastic, born in Suffolk in 1495; died in 1563. Although educated a Roman Catholic, he became a Protestant, and the intolerance of the Catholic party drove him to the Netherlands. On the accession of Edward VI he returned to England, was presented to the living of Bishopstoke, Hampshire, and soon after nominated Bishop of Ossory, in Ireland. Here, on his preaching the reformed religion, the popular fury against him reached such a pitch that in one tumult five of his domestics were murdered in his presence. On the accession of Mary he lay some time concealed in Dublin, and after many hardships found refuge in Switzerland. At her death he was appointed by Elizabeth a prebend of Canterbury, where he died. His fame as an author rests upon his *Scriptorum Illustrium Majoris Britanniæ Catalogus,* or 'An Account of the Lives of Eminent Writers of Britain,' containing fourteen centuries, being rewritten from an earlier work embracing only five centuries. It is compiled from various writers, chiefly from the antiquary Leland. He was also the author of nineteen miracle plays, printed in 1558.

Balear'ic Crane (*Balearica pavonina*), a handsome species of crested crane inhabiting Northwest Africa.

Balearic (bal-e-ar'ik) ISLANDS, a group of five islands, S. E. of Spain, including Majorca, Minorca, Iviza, Formentera and Cabrera. The popular derivation of the ancient name Baleares (Gr. *ballein,* to throw) has reference to the repute of the inhabitants for their skill in slinging, in which they distinguished themselves both in the army of Hannibal and under the Romans, by whom the islands were annexed in 123 B.C. After being taken by the Vandals, under Genseric, and in the eighth century by the Moors, they were taken by James I, King of Aragon, 1220–34, and constituted a kingdom, which in 1375 was united to Spain. The islands now form a Spanish province, with an area of 1860 square miles, and 312,646 inhabitants. See separate articles.

Baleen (ba-lēn'), whale-bone in the rough or natural state.

Bale-fire (A. Saxon *bæl,* a great fire), in its older and strict meaning any great fire kindled in the open air, or in a special sense the fire of a funeral pile. It has frequently been used as synonymous with beacon-fire, or a fire kindled as a signal, Sir Walter Scott having apparently been the first to employ it in this sense; and it has at various times, with even less reason, been confounded with 'bale' in the sense of evil or fatal.

Balen (bä'len), HENDRIK VAN, painter, born at Antwerp 1575; died 1632. His works, chiefly classical, religious, and allegorical—some of them executed in partnership with Breughel—are to be found in most of the European galleries.

He was the first master of Vandyck and Snyders. Three of his sons also followed the art, but the best of them, John van Balen (1611–54), was inferior to his father.

Bales (bālz), PETER, a famous calligrapher, born in London in 1547, died about 1610. His skill in micrography is referred to by Holinshed and Evelyn. He was one of the early inventors of shorthand, and is said to have been employed to imitate signatures by Sir Francis Walsingham during the reign of Queen Elizabeth.

Balfe (balf), MICHAEL WILLIAM, composer, was born in Dublin May 15, 1808. In his seventh year he performed in public on the violin, and at sixteen took the part of the Wicked Huntsman in *Der Freischütz* at Drury Lane. In 1825 he went to Italy, wrote the music for a ballet *La Peyrouse* for the Scala theater at Milan, and in the following year sang at the Théâtre Italien, Paris, with moderate success. He returned to Italy, and at Palermo produced his first opera, *I Rivali* (1829). For five years he continued singing and composing operas for the Italian stage. In 1835 he returned to England, and his *Siege of Rochelle*, received with favor at Drury Lane, was followed by the *Maid of Artois* (1836), *Joan of Arc* (1837), *Falstaff* (1838), *Bohemian Girl* (1843), *Maid of Honor* (1847), *Rose of Castile* (1857), *Satanella* (1858), *Blanche de Nevers* (1860), etc. The composer died October 20, 1870. His posthumous opera, *The Talisman*, was first performed in London in June, 1874. His operas are melodious and many of the airs are excellent.

Balfour (bal'fur) SIR ANDREW, a Scottish botanist and physician, born in Fifeshire in 1630. After completing his studies at St. Andrews and London, he settled at Edinburgh, where he planned, with Sir Robert Sibbald, the Royal College of Physicians, and was elected its first president. Shortly before his death he founded a hospital in Edinburgh which became the Royal Infirmary. He died in 1694.

Balfour, ARTHUR JAMES, EARL OF WHITTINGHAME, a British statesman born in Scotland in 1848, educated at Cambridge. He entered Parliament in 1874, becoming secretary to his uncle, Lord Salisbury. He was made secretary for Scotland, 1886; secretary for Ireland, 1889; and succeeded Salisbury as Unionist premier, 1902-05. During the coalition war ministry he became first lord of the Admiralty in 1915, and later was foreign secretary. He headed the British war mission to the United States, 1917; was a delegate to the Peace Conference at Versailles, 1919, and the Armaments' Limitation Conference at Washington, 1921. He was the author of *Foundations of Belief* and other works. In 1922 he was elevated to the peerage.

Balfour, FRANCIS MAITLAND, an embryologist, born in 1851, studied at Harrow and Trinity College, Cambridge. Articles on his special study gained him a high reputation while still an undergraduate, and after further work at Naples he published in 1874, in conjunction with Dr. M. Foster, the *Elements of Embryology*, a valuable contribution to the literature of biology. He was elected a fellow of his college, fellow and member of council of the Royal Society, and in 1881 professor of animal morphology at Cambridge. The promise of his chief work, *Comparative Embryology* (1880-81) was unfulfilled, as in the latter year he was killed by a fall on Mont Blanc.

Balfour, SIR JAMES, a Scottish lawyer and public character of the sixteenth century, was a native of Fifeshire. In youth, for his share in the conspiracy against Cardinal Beaton, he was condemned with Knox to the galleys; but after his escape in 1550 he found it to his interest to change his opinions, and later he was appointed, through the favor of Queen Mary, Lord of Session, and member of the privy-council. In 1567 he was appointed governor of Edinburgh Castle, but had no scruple in surrendering it to Murray, who made him president of the Court of Session. In 1570 he was charged with a share in the murder of Darnley, but got off by bribery. He was afterwards instrumental in compassing the death of Regent Morton by the production of a deed signed by him and bearing on the Darnley murder. His own death took place in 1583.

Balfour, JOHN HUTTON, a distinguished botanist, born 1808, died 1884. He graduated at Edinburgh University in arts and in medicine; in 1841-45 was professor of botany in Glasgow University; and in the latter year removed to Edinburgh to occupy a similar post, resigning his chair in 1879. He wrote valuable botanical text-books, including *Elements*, *Outlines*, *Manual*, and *Classbook*, besides various other works.

Balfroosh (bal-frūsh'), or BAB-FURUSH', a town of Persia, province of Mazanderan, about twelve miles from the Caspian, a great emporium of the trade between Persia and Russia. Pop. estimated 50,000.

Bali (bä'lē), an island of the Indian Archipelago east of Java, belonging to Holland; greatest length, 85, greatest breadth, 55 miles; area, about 2260 square miles; pop. about 700,000. It consists chiefly of a series of volcanic mountains, of which the loftiest, Agoong, reaches an elevation of 10,497 ft., the central chain averaging 3282 ft. Principal products, rice, cocoa, coffee, indigo, cotton, etc. The people are akin to those of Java and are mainly Brahmans in religion. It is divided into eight provinces under native rajahs, and forms one colony with Lombok.

Baliol, or BALLIOL (bā'li-ol or bal'li-ol), JOHN DE, of Barnard Castle, Northumberland, father of King John Baliol, a great English (or Norman) baron in the reign of Henry III, to whose cause he strongly attached himself in his struggles with the barons. In 1263 he laid the foundation of Balliol College, Oxford, which was completed by his widow Devorguilla or Devorgilla. She was daughter and co-heiress of Allan of Galloway, a great baron of Scotland, by Margaret, eldest daughter of David, Earl of Huntingdon, brother of William the Lion. It was on the strength of this genealogy that his son John Baliol became temporary King of Scotland. He died 1296.

Bal'iol, or BALLIOL, JOHN, King of Scotland; born about 1249, died 1315. On the death of Margaret, the Maiden of Norway and grandchild of Alexander III, Baliol claimed the vacant throne by virtue of his descent from David, Earl of Huntingdon, brother to William the Lion, King of Scotland (see above art.). Robert Bruce (grandfather of the king) opposed Baliol; but Edward I's decision was in favor of Baliol, who did homage to him for the kingdom, Nov. 20, 1292. Irritated by Edward's harsh exercise of authority, Baliol concluded a treaty with France, then at war with England; but after the defeat at Dunbar he surrendered his crown into the hands of the English monarch. He was sent with his son to the Tower, but, by the intercession of the pope in 1297, obtained liberty to retire to his Norman estates, where he died.—His son, EDWARD, in 1332 landed in Fife with an armed force, and having defeated a large army under the regent Mar (who was killed), got himself crowned king, but was driven out in three months.

Balista, or BALLISTA (bal-lis'ta), a machine used in military operations by the ancients for hurling heavy missiles, thus serving in some degree the purpose of the modern cannon. The motive power appears to have been obtained by the torsion of ropes, fibers, catgut, or hair. They are said to have sometimes had an effective range of a quarter of a mile, and to have thrown stones weighing as much as 300 lbs. The balistæ differed from the *catapultæ*, in that the latter were used for throwing darts.

Balis'tidæ. See *Trigger-fishes.*

Balize (ba-lēz'). See *Belize.*

Bal'kan (anc. *Hæmus*), a rugged chain of mountains, extending from Cape Emineh, on the Black Sea, in Eastern Roumelia, westward to the borders of Servia, though the name is sometimes used to include the whole mountain system from the Black Sea to the Adriatic, the region south of Austria and Russia, or south of the Danube and Save, forming the Balkan Peninsula. The range, which is over 200 miles in length, forms the water-shed between the streams flowing northward into the Danube and those flowing southward to the Ægean, the chief of the latter being the Maritza. The average height is not more than 5000 ft., but the highest point, Olympus is 9794 ft. As a political boundary it divides Bulgaria from eastern Roumelia. It was long the natural bulwark of Turkey against enemies on its European frontiers. Yet in the Russo-Turkish war of 1877–78 the Russian troops managed to cross it without great difficulty, though they had to encounter a stubborn resistance at the Shipka Pass, where a Turkish army of 32,000 men ultimately surrendered to them.

Balkan Free States, Bulgaria, Roumania, Servia, Montenegro, Greece and Albania.

Balkan War. In 1912 war broke out between Turkey and the Balkan states—Bulgaria, Servia, Montenegro and Greece. The Porte had for centuries struggled to raise in Macedonia a barrier against the forces of western civilization and every attempt made by European powers to reform institutions ended in failure. The treatment of the Christian subjects of Turkey was often one of revolting cruelty. These facts, and the gradual infusion of western ideas among the population of the Turkish provinces, led to widespread dissatisfaction. The war was at the root a struggle between the diverse political systems and social conditions of the West and the East.

Domestic unrest in Turkey and the distractions of the Turko-Italian war made the year 1912 an opportune time for the states to act. On October 8 war was declared on Turkey by Montenegro.

and on October 17 by Greece. By the end of October the allies had practically possessed themselves of Macedonia, and the Bulgarians were holding the main Turkish force behind a fortified line within 50 miles of Constantinople. War continued until December 3, the Montenegrolians besieging Skutari, the Servians capturing Monastir and Durazzo, the Greeks capturing Solonika, and the Bulgarians, in their attempt to overwhelm the Turks in Thrace and push them back

MAP OF THE BALKANS

into Constantinople, winning the great battles of Kirk-Killiseh, Lule Burgas and Serai. The armistice of December 3, suspended hostilities and the negotiations of peace opened in London December 16.

Approached by the powers, Turkey finally consented to yield a large portion of her territory. The consent, however, led to angry demonstrations in Constantinople and the overthrow of the Kiamil Cabinet. On February 3 hostilities were reopened. On March 16, the great Turkish stronghold, Adrianople fell before the Bulgarians and Servians after a five months' seige.

Peace was not concluded until May 30, 1913. *The Treaty of London* provided that Turkey should cede to the allies of Europe all territory on the mainland of Europe west of a line to be drawn from Enos to Midia. Turkey ceded Crete to the allies. The disposition of the rest of the Turkish isles was left to the Powers.

Disagreement among the allies as to the settlement of boundaries immediately arose, leading to open hostilities. According to an agreement made before the the war, the territory to be occupied by the victorious States was to be apportioned upon a pre-arranged plan; but the Powers stepped in and set up out of the territory which was to have fallen to the share of Servia and Greece, the autonomous principality of Albania. Bulgaria refused to recognize this new condition or the justice of the Greek and Servian demands for compensation for the loss of Albania or for their support of the Bulgarian operations in Thrace. The Bulgars refused to give over any of Macedonia to the Servians and Greeks. The Greeks concluded with the Servians a secret treaty of offense against Bulgaria and a second war was soon in progress. Roumania joined the enemies of Bulgaria, coveting a strip of territory on the south side of the Danube.

While the Roumanians fought no battle worth mentioning it was their presence within thirty miles of the Bulgarian capital that forced King Ferdinand to apply for terms of peace. The *Treaty of Bukharest* was signed on August 10. 1913, dividing up the territory as indicated on the accompanying map. Throughout the war Bulgaria showed herself the leader. It was she who conceived the plan of the campaign and without her well-trained army the struggle against Turkey could never have been so successfully carried on. The second Balkan war left Bulgaria with hopes unfulfilled, and when the Great war broke out in 1914 she sided with Germany and Austria-Hungary; the only one of the Balkan nations to join hands with the Central Power. Roumania, at first neutral, joined the Allies. *See European War.*

Balkh (bälk or bäl*h*), a city in the north of Afghanistan, in Afghan Turkestan, at one time the emporium of the trade between India, China and Western Asia. It was long the center of Zoroastrianism and was also an important Buddhist center. In 1220 it was sacked by Genghis Khan, and again by Timur in the fourteenth century. The remains of the ancient city extend for miles. The town is now merely a village, but a new town has risen up an hour's journey north of the old, the residence of the Afghan governor, with a population of about

10,000 to 15,000. Silk weaving is an active industry. The district, which formed a portion of ancient Bactria, lies between the Oxus and the Hindu Kush, with Badakshan to the east and the desert to the west. In the vicinity of the Oxus, where there are facilities for irrigation, the soil is rich and productive, and there are many populous villages.

Bal'kis, the Arabian name of the Queen of Sheba who visited Solomon. She is the central figure of innumerable Eastern legends and tales.

Ball, GAME OF. Ball-playing was practised by the ancients, and old and young amused themselves with it. The Phæacian damsels are represented in the *Odyssey* as playing it to the sound of music; and Horace represents Mæcenas as amusing himself thus in a journey. In the Greek gymnasia, the Roman baths, and in many Roman villas a *sphæristerium* (a place appropriated for playing ball) was to be found, the games played being similar to those indulged at the present day. In the middle ages the sport continued very popular both as an indoor and outdoor exercise, and was a favorite court pastime until about the end of the eighteenth century. In England football and tennis are mentioned at an early date, and a favorite game prior to the English revolution was one in which a *mall* or mallet was used, hence the name pall-mall (It. *palla*, L. *pila*, a ball) for the game and the place where it was played. The most popular modern forms are base-ball, football, cricket, golf, lawn tennis, polo, racquet, lacrosse, and basket ball.

Ball (bąl), JOHN, an itinerant preacher of the fourteenth century, excommunicated about 1367 for promulgating 'errors, schisms, and scandals against the pope, archbishops, bishops, and clergy.' He was one of the most active promoters of the popular insurgent spirit which found vent under Wat Tyler in 1381, and the couplet,

> 'When Adam dalf and Eve span,
> Who was thanne a gentleman?'

is attributed to him.

Ball, SIR ROBERT S., an astronomer, born at Dublin in 1840, graduated at Trinity College in 1861. His studies in astronomy made him professor of that science in Trinity and royal astronomer for Ireland in 1874, and professor of astronomy and geometry at Cambridge in 1892. He was knighted in 1886. He wrote *Experimental Physics*, *Theory of Screws*, and works on astronomy, mechanics, etc.

Bal'lad, a term loosely applied to various poetic forms of the song type but in its most definite sense a poem in which a short narrative is subjected to simple lyrical treatment. It was, as indicated by its name, which is related to the Italian *ballare* and O. French *baller*, to dance, originally a song accompanied by a dance. The ballad is probably one of the earliest forms of rhythmical poetic expression, constituting a species of epic in miniature, out of which by fusion and remolding larger epics were sometimes shaped. As in the folk-tales, so in the ballads of different nations, the resemblances are sufficiently numerous and close to point to the conclusion that they have often had their first origin in the same primitive folk-lore or popular tales. But in any case, excepting a few modern literary ballads of a subtler kind, they have been the popular expression of the broad human emotions clustering about some strongly outlined incidents of war, love, crime, superstition, or death. It is next to certain that in the Homeric poems fragments of older ballads are embedded; but the earliest ballads, properly so called, of which we have record were the *ballistia*, or dance-songs of the Romans, of the kind sung in honor of the deeds of Aurelian in the Sarmatic war by a chorus of dancing boys. In their less specialized sense of lyric narratives, their early popularity among the Teutonic race is evidenced by the testimony of Tacitus, of the Gothic historian Jordanes, and the Lombard historian Paulus Diaconus; and many appear to have been written down by order of Charlemagne and used as a means of education. Of the ballads of this period, however, only a general conception can be formed from their traces in conglomerates like the *Nibelungenlied;* the more artificial productions of the Minnesänger and Meistersänger overlying the more popular ballad until the fifteenth century, when it sprang once more into vigorous life. A third German ballad period was initiated by Bürger under the inspiration of the revived interest in the subject shown in Great Britain and the publication of the *Percy Reliques;* and the movement was sustained by Herder, Schiller, Goethe, Heine, Uhland, and others. The earlier German work is, however, of inferior value to that of Scandinavia, where, though comparatively few manuscripts have survived, and those not more than three or four centuries old, a more perfect oral tradition has rendered it possible to trace the original stock of the twelfth century.

Of the English and Scottish ballads anterior to the thirteenth century there are few traces beyond the indication that they were abundant, if indeed anything can be definitely asserted of them earlier

than the fourteenth century. Among the oldest may be placed *The Little Gest of Robin Hood*, *Hugh of Lincoln*, *Sir Patrick Spens*, and the *Battle of Otterbourn*. In the fifteenth century specimens multiply rapidly: ballad-making became in the reign of Henry VIII a fashionable amusement, the king himself setting the example; and though in the reign of Elizabeth ballads came into literary disrepute and ballad singers were brought under the law, yet there was no apparent check upon the rate of their production. Except perhaps in the north of England and south of Scotland, there was, however, a marked and increasing tendency to vulgarization as distinct from the preservation of popular qualities. The value of the better ballads was lost sight of in the flood of dull, rhythmless, and frequently scurrilous verse. The modern revival in Britain dates from the publication of Ramsay's *Evergreen and Tea-table Miscellany* (1724–27) and of the selection made by Bishop Percy from his seventeenth-century MSS. (1765), a revival not more important for its historical interest than for the influence which it has exercised upon all subsequent poetry.

The threefold wave discernible in German, if not in British, ballad history, is equally to be traced in Spain, which alone among the Latinized countries of Europe has songs of equal age and merit with the British historic ballads. The principal difference between them is, that for the most part the Spanish romance is in trochaic, the British ballad in iambic metre. The ballads of the Cid date from about the end of the twelfth and beginning of the thirteenth century; and then followed an interval of more elaborate production, a revival of ballad interest in the sixteenth century, a new declension, and finally a modern and still persisting enthusiasm.

The French poetry of this kind never reached any high degree of perfection, the romance, farce, and lyric flourishing at the expense of the ballad proper. Of Italy much the same may be said, though Sicily has supplied a great store of ballads; and nearly all the Portuguese poetry of this kind is to be traced to a Spanish origin. The Russians have lyrico-epic poems, of which some, in old Russian, are excellent, and the Servians are still in the ballad-producing stage of civilization. Modern Greece has also its store of ballads to which Madame Chénier called attention in the middle of last century. Both in Greece and Russia and in the Pyrenees the old habit of improvising song as an accompaniment to dance still exists.

Ballade (bal-ȧd′), the earlier and modern French spelling of *ballad*, but now limited in its use to a distinct verse-form introduced into English literature of late years from the French and chiefly used by writers of *vers-de-société*. It consists of three stanzas of eight lines each, with an *envoy* or closing stanza of four lines. The rhymes, which are not more than three, follow each other in the stanzas thus; a, b, a, b; b, c, b, c, and in the envoy, b, c, b, c; and the same line serves as a refrain to each of the stanzas and to the envoy. There are other varieties, but this may be regarded as the strictest, according to the precedent of Villon and Marot.

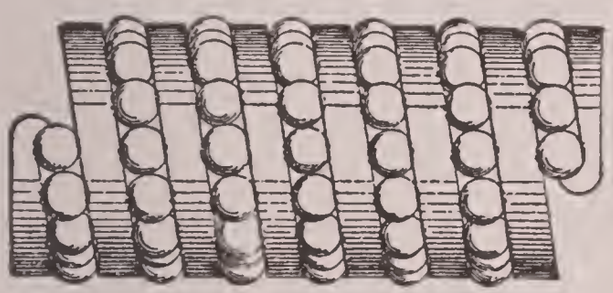
Ballantyne (bal′lan-tīn), JAMES, the printer of Sir W. Scott's works, born at Kelso 1772, died at Edinburgh 1833. Successively a solicitor and a printer in his native town, at Scott's suggestion he removed to Edinburgh, where the high perfection to which he had brought the art of printing, and his connection with Scott, secured him a large trade. The printing firm of James Ballantyne & Co. included Scott, James Ballantyne and his brother John (who died in 1821). For many years he conducted the *Edinburgh Weekly Journal*. His firm was involved in the bankruptcy of Constable & Co., by which Scott's fortunes were wrecked, but Ballantyne was continued by the creditors' trustee in the literary management of the printing-house. He survived Scott only about four months.

Ballarat (bal-la-rat′), or BALLAARAT, an Australian town in Victoria, chief center of the gold-mining industry of the colony, and next in importance to Melbourne, from which it is distant W. N. W. about sixty miles direct. It consists of two distinct municipalities, Ballarat West and Ballarat East, separated by the Yarrowee Creek, and has many handsome buildings, and all the institutions of a progressive and flourishing city, including hospital, mechanics' institute and library, free public library, Anglican and R. C. cathedrals, etc. Gold was first discovered in 1851, and the extraordinary richness of the field soon attracted hosts of miners. The surface diggings having been exhausted, the precious metal is now got from greater depths, and there are mines as deep as some coal-pits, the gold being obtained by crushing the auriferous quartz. The mines give employment to over 6000 men. There are also foundries, woolen mills,

flour-mills, breweries and distilleries, etc. Population 43,701.

Ballast (bal'ast), signifies (1) heavy matter, as stone, sand, iron, or water placed in the bottom of a ship or other vessel to sink it in the water to such a depth as to enable it to carry sufficient sail without oversetting. (2) The sand placed in bags in the car of a balloon to steady it and to enable the aëronaut to lighten the balloon by throwing part of it out. (3) The material used to fill up the space between the rails on a railway in order to make it firm and solid.

Ball-bearing, an axle bearing in which the shaft is supported, not on a cylindrical surface, but on a number of small, hard steel balls, which turn freely as the shaft revolves and greatly reduce the friction. This bearing, first largely used on the bicycle, has been



Ball Bearing.

extended to wagon wheels and other axle movements, in which the element of friction is largely eliminated. Its range of application to machinery of all kinds is almost unlimited.

Ball-cock, a kind of self-acting stop-cock opened and shut by means of a hollow sphere or ball of metal attached to the end of a lever connected with the cock. Such cocks are often employed to regulate the supply of water to cisterns. The ball floats on the water in the cistern by its buoyancy, and rises and sinks as the water rises and sinks, shutting off the water in the one case and letting it on in the other.

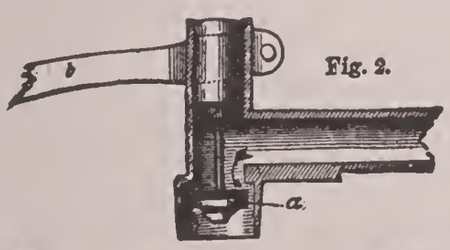


Fig. 2.

Fig. 1.

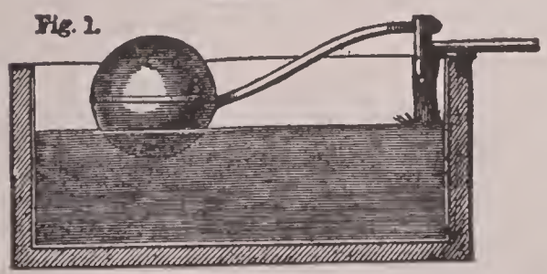
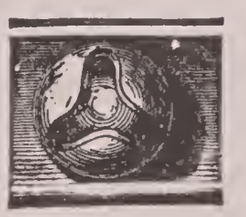


Fig. 1, Cistern with Ball-cock attached.
Fig. 2, Internal structure of Cock.
a, Valve shown open so as to admit water. *b*, Arm of the lever, which being raised shuts the valve.

Ballet (bal'ā), a species of dance, usually forming an interlude in theatrical performances, but principally confined to opera. Its object is to represent, by mimic movements and dances, actions, characters, sentiments, passions, and feelings, in which several dancers perform together. The ballet is an invention of modern times, though pantomimic dances were not unknown to the ancients. The dances frequently introduced into operas seldom deserve the name ballet, as they usually do not represent any action, but are destined only to give the dancers an opportunity of showing their skill, and the modern ballet in general, from an artistic point of view, is a very low-class entertainment.

Ball-flower, an architectural ornament resembling a ball placed in a circular flower, the three petals of which form a cup round it; usually inserted in a hollow molding, and generally characteristic of the Decorated Gothic style of the fourteenth century.



Ballia (bal'li-a), a town of India, in the Northwestern Provinces, on the Ganges, the administrative headquarters of a district of same name. Pop. 15,320.

Ballina (bàl-e-nà'), a town and river-port, Ireland, County Mayo, on both banks of the Moy, about 5 miles above its mouth in Killala Bay, with a considerable local and also a little coasting and foreign trade. Pop. 4800.

Ballinasloe (ballin-a-slō'), a town, Ireland, in Galway and Roscommon Counties, 15 miles southwest of Athlone, on both sides of the Suck, noted for its cattle fair, from 5th till 9th October, the most important in Ireland. Pop. 4904.

Ballinger (bal'in-jer), RICHARD ACHILLES, lawyer, born at Boonesboro, Iowa, in 1858; graduated at Williams College in 1884; studied law and practiced in Washington State; became judge of the superior court; was mayor of Seattle 1904–06; commissioner of General Land Office after March 4, 1877; appointed Secretary of the Interior by President Taft in 1909. As such he was accused of favoring speculators seeking to grasp the coal deposits of Alaska and

a congressional committee was appointed to investigate the charges. The committee reported in his favor, but he resigned on March 7, 1911; died June 6, 1922.

Balliol College, Oxford, was founded about 1263 by John Balliol (or Baliol) of Barnard Castle, Durham, and Devorgilla, his wife (parents of John Balliol, King of Scotland). There are a large number of valuable scholarships and exhibitions, including the Snell exhibitions, fourteen in number, held by students from Glasgow University.

Ballista (bal-lis'ta). See *Balista.*

Ballistic Pendulum, an apparatus formerly used for ascertaining the velocity of military projectiles and consequently the force of fired gunpowder. It has been supplanted by the more accurate electric-ballistic machines, such as the Boulengé chronograph and the Bashforth chronograph. In the ballistic pendulum system a piece of ordnance was fired against bags of sand supported in a strong case or frame, supported so as to swing like a pendulum. The arc through which it vibrated was shown by an index, and the amount of vibration formed a measure of the force or velocity of the projectile.

Ballistics, the science which treats of the motion of warlike missiles. It is divided into two parts: exterior ballistics, in which the motion of the projectile after it leaves the gun is considered; and interior ballistics, in which the pressure of the powder gas is analyzed in the bore.

Balloon (bal-lön'). See *Aeronautics.*

Balloon-fish (*Tetraödon lineätus*), order Plectognathi, a curious tropical fish that can inflate itself so as to resemble a ball.

Ballot, VOTING BY, signifies literally voting by means of little balls (called by the French *ballotes*), usually of different colors, which are put into a box in such a manner as to enable the voter, if he chooses, to conceal for whom or for what he gives his suffrage. The method is adopted by most clubs in the election of their members—a white ball indicating assent, a black ball dissent. Hence, when an applicant is rejected, he is said to be *blackballed.* The term voting by ballot is also applied in a general way to any method of secret voting, as, for instance, when a person gives his vote by means of a ticket bearing the name of the candidate whom he wishes to support. In this sense vote by ballot is the mode adopted in electing the members of legislative assemblies in most countries, as well as the members of various other bodies. In ancient Greece and Rome the ballot was in common use. In Britain it had long been advocated in the election of members of Parliament and of municipal corporations, and was finally introduced by an act passed in 1872.

In the United States the ballot was in use in early colonial times, and was made compulsory in the constitutions of New Jersey, Pennsylvania, and all other states. The Australian ballot system, originated about 1870 in the British colonies, has recently been adopted by law in three-fourths of the United States, but with certain variations, which diminish its value as a simple and equitable system of voting. By a carefully contrived system of arranging the names on the ballot, secluding each voter at the polls, and marking and folding the ballots, it claims to secure greater secrecy and honesty than any other method of voting.

Ballou (bal-lö'), HOSEA, American theologian, born in New Hampshire in 1771. Settling at Boston in 1817, he published several theological works, in which he argued in favor of universal salvation, and subsequently issued the *Universalist Magazine,* followed by the *Universalist Expositor,* now known as the *Universalist Quarterly Review.* He is looked upon as the founder of modern Universalism. Died in 1852.

Ballymena (bal-li-mē'na), a town of Ireland, County Antrim, 22 miles from Belfast, with a considerable trade in linens and linen yarns, the manufacture of which is carried on to a great extent. Pop. (1901) 10,886.

Ballymoney (bal-li-mō'ni), a town of Ireland, County Antrim, 38 miles N.W. of Belfast; has manufactures of linen, chemicals, tanning, and brewing. Pop. 3049.

Ballyshannon, a small seaport of Ireland, County Donegal. Pop. 2400.

Balmaceda (bal-ma-sē'da), JOSÉ MANUEL, Chilean statesman, born 1838; early distinguished as a political orator; advocated in Congress separation of church and state; as premier, in 1884, introduced civil marriage; elected president in 1886. A conflict with the Congressional party, provoked by his alleged cruelties and official dishonesty, and advocacy of the claim of Signor Vicuna as his legally elected successor, resulted in Balmaceda's overthrow and suicide, 1891.

Balm of Gilead, the exudation of a tree, *Balsamoden-*

dron Gileadense, nat. order *Burseraceæ*, a native of Arabia Felix, and also obtained from the closely allied species *Balsamodendron opobalsămum*. The leaves of the former tree yield when bruised a strong aromatic scent; and the balm of Gilead of the shops, or balsam of Mecca

Balm of Gilead—*Balsamodendron Gileadense.*

or of Syria, is obtained from it by making an incision in its trunk. It has a yellowish or greenish color, a warm, bitterish, aromatic taste, and an acidulous, fragrant smell. It is valued as an odoriferous unguent and cosmetic.

Balnaves (bal-nav'es), HENRY, of Halhill, a Scottish reformer, was born at Kirkcaldy, educated at St. Andrews, and became a Lord of Session and a member of the Scottish Parliament in 1538, and secretary of state in 1543. He was one of the commissioners appointed in 1543 to treat of the proposed marriage between Edward VI and Mary. In 1547 he was one of the prisoners taken in the castle of St. Andrews and exiled to France where he wrote his *Confession of Faith*. Recalled in 1554, he busily engaged in the establishment of the reformed faith and assisted in revising the *Book of Discipline*. He died in 1579.

Balrampur (bal-ram'pur). See *Bulrampur.*

Balsa (bal'sa), a kind of raft or float used on the coast and rivers of

Balsa of Inflated Skins.

Peru and other parts of South America for fishing, for landing goods and passengers through a heavy surf, and for other purposes where buoyancy is chiefly wanted. It is in common use on Lake Titicaca, where it is made of rushes bound firmly together.

Balsam (bal'sam), the common name of succulent plants of the genus *Impatiens*, family Balsaminaceæ, having beautiful, irregular flowers, cultivated in gardens and greenhouses. *Impatiens balsamina*, a native of the East Indies, is a common cultivated species. The Balsaminaceæ are distinguished by their many-seeded fruit. See *Impatiens.*

Balsam, an aromatic, resinous substance, flowing spontaneously or by incision from certain plants. A great variety of substances pass under this name. But in chemistry the term is confined to such vegetable juices as consist of resins mixed with volatile oils, and yield the volatile oil on distillation. The resins are produced from the oils by oxidation. A balsam is thus intermediate between a volatile oil and a resin. It is soluble in alcohol and ether, and capable of yielding benzoic acid. The balsams are either liquid or more or less solid; as, for example, the balm of Gilead, and the balsams of copaiba, Peru, and Tolu. Benzoin, dragon's-blood, and storax are not true balsams, though sometimes called so. The balsams are used in perfumery, medicine, and the arts. See *Copaiba*, etc. *Balsam of Gilead* or of *Mecca*, balm of Gilead (which see). *Canada balsam.* See the art. *Canada Balsam.*

Balsam Fir, the balm of Gilead fir. See *Balm of Gilead.*

Balsa'mo, JOSEPH. See *Cagliostro, Count.*

Balsamodendron (bal-sa-mō-den'dron), a genus of trees or bushes, order *Burseraceæ*, species of which yield such balsamic or resinous substances as balm of Gilead, bdellium, myrrh, etc.

Balta (bal'tà), a Russian town, gov. of Podolia, on the Kodema, an affluent of the Bug, 115 miles N. N. W. of Odessa. Pop. 24,400.

Baltic (bal'tik) PROVINCES, a term commonly given to the Russian governments of Courland, Livonia, and Esthonia.

Baltic Sea, an inland sea or large gulf connected with the North Sea, washing the coasts of Denmark, Germany, Russia, and Sweden; over 900 miles long, extending to 200 broad; superficial extent, together with the Gulfs of Bothnia and Finland, 171,743 sq. miles. Its greatest depth is 420 fathoms;

mean, 36 fathoms. A chain of islands separates the southern part from the northern, or Gulf of Bothnia. In the northeast the Gulf of Finland stretches far into Russia, and separates Finland from Esthonia; the Gulf of Riga washes the shores of the three Russian governments of Courland, Livonia, and Esthonia; while the Gulf of Danzig is an inlet on the Prussian coast. The water of the Baltic is colder and clearer than that of the ocean; it contains a smaller proportion of salt, and the ice obstructs the navigation three or four months in the year. Among the rivers that enter it are the Neva, Dwina, Oder, Vistula and Niemen. Islands: Samsoe, Moen, Bornholm, Langeland, Laaland, which belong to Denmark (besides Zealand and Funen); Gottland and Oeland, belonging to Sweden; Rügen, belonging to Prussia; the Aland Islands, Dagoe, and Oesel, belonging to Russia. The Sound, the Great and the Little Belt lead from the Kattegat into the Baltic. The Baltic and North Sea are connected by means of the Eider and a canal from it to the neighborhood of Kiel, and by the Kaiser Wilhelm canal, 61 miles long, completed in 1895, large enough to permit the passage of men-of-war.

Baltimore (bal'ti-mōr), a city and port in Maryland, finely situated on the N. side of the Patapsco, 14 miles above Chesapeake Bay, 40 miles N. E. of Washington, and 96 miles S. W. of Philadelphia. Baltimore takes its name from Lord Baltimore, the founder of Maryland; it was first laid out as a town in 1729; and was incorporated as a city in 1797. It is well built, chiefly of brick, and is known as the 'monument city,' from the many public monuments which adorn it, the principal being the Washington monument. Among its notable buildings are the City Hall, built in Renaissance style, of white marble, with a tower and dome rising 260 feet; the Peabody Institute, containing a library, art gallery, etc.; the Maryland Institute; the Johns Hopkins Hospital; the Roman Catholic cathedral; the Enoch Pratt Free Library, with 200,000 volumes, and various municipal buildings. It has numerous educational institutions, chief among which, and now one of the most important in the United States, is the Johns Hopkins University, endowed with $3,500,000 by its founder (whose name it bears). In its excellence of system and perfection of equipment it vies with the best European institutions of its kind. The University of Maryland embraces one of the oldest medical schools in the United States, established in 1812. Druid Hill Park, on the outer limits of the city, covers about 700 acres and is noted for its natural beauty. Baltimore vies with Philadelphia as being a city of homes, each family, as a rule, having a house of its own. The leading industries are the canning of fruits and oysters and the manufacture of clothing, boots and shoes, cotton goods, machinery, etc. The canning industry is very large, the cotton-duck mills employ 6000 hands, and

there are extensive steel and copper-refining plants. Shipbuilding is also of importance. As a flour market Baltimore is an important center; and it does an immense trade in exporting tobacco, coal and other products. The harbor is very extensive, and there are many railroad lines and waterways, adding greatly to its commercial advantages. Pop. (1900) 508,957; (1910) 558,485; (1920) 733,826.

Baltimore, GEORGE CALVERT, LORD, born in Yorkshire about 1580; died in London, 1632. He was for some time secretary of state to James I, but this post he resigned in 1624 in consequence of having become a Roman Catholic. Notwithstanding this he retained the confidence of the king, who in 1625 raised him to the Irish peerage, his title being from Baltimore, a fishing village of Cork. He had previously obtained a grant of land in Newfoundland, but as this colony was much exposed to the attacks of the French he left it, and obtained another patent for Maryland. He died before the charter was completed, and it was granted to his son Cecil, who deputed the governorship to his brother Leonard (1606–47).

Baltimore Oriole (ō′ri-ōl), an American bird, the *Ictĕrus Baltimorii*, family Icteridæ, nearly allied to the Sturnidæ, or starlings. It is a migratory bird, and is known also by the names of 'golden robin,' 'hang-bird,' and 'fire-bird.' It is about 7 inches long; the head and upper parts are black; the under parts of a brilliant orange hue. It builds a pouch-like nest, very skillfully constructed of threads deftly interwoven, suspended from a forked branch and shaded by overhanging leaves. It feeds on insects, caterpillars, beetles, etc. Its song is a clear, mellow whistle.

Baluchistan (ba-lō′chi-stän), a country in Asia, the coast of which is continuous with the northwestern seaboard of India, bounded on the north by Afghanistan, on the west by Persia, on the south by the Arabian Sea, and on the east by Sind. It has an area of 132,000 sq. miles, and a population estimated at about 1,000,000; of the districts under British administration, 300,000: The whole country, though portions of it are independent, is officially included in the Empire of India. The general surface of the country is rugged and mountainous, with some extensive intervals of barren sandy deserts, and there is a general deficiency of water. The country is almost entirely occupied by pastoral tribes under semi-independent sirdars or chiefs. The inhabitants are divided into two great branches, the Baluchis and Brahuis, differing in their language, figure, and manners. The Baluchi language resembles the modern Persian, the Brahui presents many points of agreement with the Dravidian languages of India. The Baluchis in general have tall figures, long visages, and prominent features; the Brahuis, on the contrary, have short, thick bones, with round faces and flat lineaments, with hair and beards frequently brown. Both races are zealous Mohammedans, hospitable, brave, and capable of enduring much fatigue. The Khan of Khelat is nominal ruler of the whole land, and in 1877 concluded a treaty with Britain, in virtue

Baluchis on the Lookout.

of which he became a feudatory of the British monarch. The right had already been secured of occupying at pleasure the mountain passes between Khelat and Afghanistan; but the new treaty placed the whole country at the disposal of the British government for all military and strategical purposes.

Baluster (bal′us-tėr), a small column or pilaster of various forms and dimensions, often adorned with moldings, used for balustrades.

Balustrade (bal-us-trād′), a range of balusters, together with the cornice or coping which they support, used as a parapet for bridges or the roofs of buildings, or as a mere termination to a structure; also serving as a fence or enclosure for altars, balconies, terraces, staircases, etc.

Baluze (bà-lüz), ÉTIENNE, French historian and miscellaneous writer, born in 1630; died in 1718. For more than thirty years he was librarian to M. de Colbert and was appointed professor of

canon law in the royal college, but displeasing Louis XIV with his *Histoire générale de la maison d'Auvergne*, he was sent into exile and his property confiscated. He succeeded in returning to Paris, but did not regain his position. He left many MSS. and a large number of printed volumes, including *Regum Francorum Capitularia*, 2 vols., and *Miscellanea*, 7 vols.

Balzac (bål-zåk), HONORÉ DE, a celebrated French novelist, was born at Tours in 1799; died in 1850. Before completing his twenty-fourth year he had published a number of novels under various *noms de plume*, but the success attending all was very indifferent; and it was not till 1829, by the publication of *Le Dernier Chouan*, a tale of La Vendée, and the first novel to which Balzac appended his name, that the attention of the public was diverted to the extraordinary genius of the author. A still greater popularity attended his *Physiologie du Mariage*, a work full of piquant and caustic observations on human nature. He wrote a large number of novels, all marked by a singular knowledge of human nature and distinct delineation of character, but apt to be marred by exaggeration. Among his best-known works are: *Scènes de la Vie de Province; Scènes de la Vie Parisienne; Le Père Goriot; Eugénie Grandet;* and *Le Médecin de Campagne* ('The Country Doctor'). The publication of this last, 1835, led to a correspondence between Balzac and the Countess Eveline de Hanska (the 'Polish Lady' to whom he dedicated *Modeste Mignon*, 1844), and whom he married fifteen years later. Early in his career he embarked on a number of business ventures which turned out unsuccessfully, and it was largely to pay the debts incurred by these failures that he wrote so voluminously.

Balzac, JEAN LOUIS GUEZ, DE, French writer, born at Angoulême in 1597; died in 1654. He was admitted into the Academy in 1634. He was a powerful rhetorician and a terse writer of prose. His *Letters, Prince, Socrate Chrétien, Entretiens* and *Aristippe* are the best known of his works.

Bamba (bam'ba) a district of the Congo, W. coast of Africa. It is thickly populated, and is rich in gold, silver, copper, salt, etc.

Bambarra (bam-bar'ra), a former negro kingdom of Central Africa, now part of the French Sudan, on the Joliba or Upper Niger, first visited by Mungo Park. The country is generally very fertile, producing wheat, rice, maize, yams, etc. The inhabitants belong to the Mandingo race, and are partly Mohammedans. Excellent cotton cloth is made. Segou is the principal town. Pop. estimated at 2,000,000.

Bamberg (bam'bėrg), a thriving town of Bavaria, charmingly situated on several hills, on the navigable river Regnitz, some 3 miles from its mouth in the Main. Pop. 45,308.

Bambino (bam-bē'nō; Ital., an infant), the figure of our Saviour represented as an infant in swaddling clothes. The *Santissimo Bambino* in the church of Ara Cœli at Rome, a richly decorated figure carved in wood, is believed by the people to have a miraculous virtue in curing diseases. *Bambini* are set up for the veneration of the faithful in many places in Catholic countries.

Bambocciades (bam-boch-ādz'), pictures, generally grotesque, of common, rustic, or low life, such as those of Peter Van Laar, a Dutch painter of the 17th century, who on account of his deformity was called *Bamboccio* (cripple). Teniers is the great master of this style.

Bamboo (bam-bö'), the common name of the arborescent grasses belonging to the genus *Bambūsa*. There are many species, belonging to the warmer parts of Asia, Africa, and America, and growing from a few feet to as much as 100, requiring much moisture to thrive properly. The best-known species is *B. arundinacĕa*, common in tropical and subtropical regions. From the creeping underground rhizome, which is long, thick, and jointed, spring several

1, Bamboo (*B. arundinacea*), showing its mode of growth. 2, Flowers, leaves, and stem on a larger Scale.

round jointed stalks, which send out from their joints several shoots, the stalks also being armed at their joints with one or two sharp, rigid spines. The oval leaves, 8 or 9 inches long, are placed on short footstalks. The flowers grow in large panicles from the joints of the stalk. Some stems grow to 8 or 10 inches in diameter, and are so hard and durable as to be used for building purposes. The smaller stalks are used for walking-sticks, flutes, etc.; and indeed the plant is used for innumerable purposes in the East Indies, China, and other Eastern countries. Cottages are almost wholly made of it; also, bridges, boxes, water-pipes, ladders, fences, bows and arrows, spears, baskets, mats, paper, masts for boats, etc. The young shoots are pickled and eaten (see *Atchar*), or otherwise used as food; the seeds of some species are also eaten. The substance called *tabasheer* is a siliceous deposit that gathers at the internodes of the stems. The bamboo is imported into Europe and America as a paper material as well as for other purposes.

Bambook (bam-bŏk'), a country in Western Africa between the Falémé and Senegal rivers, about 140 miles in length, by 80 to 100 in breadth. It is on the whole hilly and somewhat rugged. The valleys and plains are remarkably fertile, and the country is rich in iron and gold. The natives are Mandingoes, mostly professed Mohammedans, most of whom acknowledge the supremacy of France. Gold and ivory are exchanged for European goods.

Bambook-butter, shea-butter.

Bambusa. See *Bamboo.*

Bamian (bå-mē-ån'), a valley and pass of Afghanistan. The valley is one of the chief centers of Buddhist worship and contains two remarkable colossal statues and other ancient monuments. The statues are carved in the cliffs on the north side of the valley. They have been much injured apparently by cannon-shot.

Bamo (bå'mō). See *Bhamo.*

Bampton Lectures, (bamp'ton), a course of lectures established in 1751 by John Bampton, canon of Salisbury, who bequeathed certain property to the University of Oxford for the endowment of eight divinity lectures to be annually delivered. A similar course of lectures, the Hulsean, is annually delivered at Cambridge.

Ban, in political law, is equivalent to excommunication in ecclesiastical. In Teutonic history the *ban* was an edict of interdiction or proscription: thus, to put a prince under the ban of the empire was to divest him of his dignities, and to interdict all intercourse and all offices of humanity with the offender. Sometimes whole cities have been put under the *ban;* that is, deprived of their rights and privileges.

Ban, anciently, a title given to the military chiefs who guarded the eastern marches of Hungary, now the title of the governor of Croatia and Slavonia, a division of the kingdom of Hungary. A province over which a ban is placed is called *banat.*

Banana (ba-na'na), a plant of the genus *Musa,* nat. order Musaceæ, being *M. sapientum,* while the plantain is *M. paradisiăca.* It is indigenous to the East Indies, and is an herbaceous plant with an underground stem. The apparent stem, which is sometimes as high as 30 feet, is formed of the closely compacted sheaths of the leaves. The leaves are 6 to 10 feet long and 1 or more broad, with a strong midrib, from which the veins are given off at right angles; they are used for thatch, basket-making, etc., besides yielding a useful fiber. The spikes of the flowers grow nearly 4 feet long, in bunches, covered with purple-colored bracts. The fruit is 4 to 10 or 12 inches long, and 1 inch or more in diameter; it grows in large bunches, weighing often from 40 to 80 lbs. The pulp is soft and of a luscious taste; when ripe it is eaten raw or fried in slices. The banana is cultivated in all tropical and subtropical countries, and is a highly important article of food. Manilla hemp is the product of a species of the Musa genus.

Bana'na, an African port, belonging to the Congo Free State, situated at the mouth of the river Congo.

Banana-bird, a pretty insessorial bird (*Ictĕrus leucoptĕryx*), a native of the West Indies and the warmer parts of America. It is a lively bird, easily domesticated, tawny and black in color, with white bars upon the wings.

Banat. See *Ban.*

Ban'bridge, a town of Ireland, County Down, 22 miles S. W. of Belfast, on the Bann. The manufacture of linen is carried on to a great extent in town and neighborhood. Pop. about 5000.

Banbury (ban'be-ri), a town of England, in Oxford, long celebrated for its cheese, its cakes, and its ale. Its famous old cross, which existed down to the time of Elizabeth, was destroyed by the Puritans. Pop. 13,463.

Banca (bang'ka), an island belonging to the Dutch East Indies, between Sumatra and Borneo, 157 miles long with a width varying from 8 to 20; pop. 1911, 120,000, a considerable proportion being Chinese. It is celebrated for its excellent tin, of which the annual yield is above 10,000 tons.

Banco (bang'kō), in commerce, a term employed to designate the money in which the banks of some countries keep or kept their accounts, in contradistinction to the current money of the place, which might vary in value or consist of light and foreign coins. The term was applied to the Hamburg bank accounts before the adoption (in 1873) of the new German coinage. The mark *banco* had a value of about 35 cents; but there was no corresponding coin. See *Bank.*

Bancroft, GEORGE, a historian, born near Worcester, Massachusetts, in 1800. He was educated at Harvard and in Germany, where he made the acquaintance of many literary men of note. In 1824 he published a translation of Heeren's *Politics of Ancient Greece,* and a small volume of poems, and was also meditating and collecting materials for a history of the United States. Between 1834 and 1840 three volumes of this history were published. In 1845 he was appointed Secretary of the Navy, and during his tenure of office established the Naval Academy at Annapolis. He was American ambassador to England from 1846 to 1849, where he enjoyed intimate association with Macaulay and Hallam the historian. He took the opportunity while in Europe to perfect his collections on American history. He returned to New York in 1849, and began to prepare for the press the fourth and fifth volumes of his history, which appeared in 1852. The sixth appeared in 1854, the seventh in 1858, the eighth soon after, but the ninth did not appear till 1866. From 1867 to 1874 he was minister plenipotentiary at the court of Berlin. The tenth and last volume of his great work appeared in 1874. An additional section appeared as a separate work in 1882: *History of the Formation of the Constitution of the United States.* Mr. Bancroft settled in Washington on returning from Germany in 1875, and died January 17, 1891. His works were reprinted in England and translated into Danish, Italian, German and French.

Bancroft, HUBERT HOWE, was born at Granville, Ohio, in 1832, and at the age of twenty started a book store in San Francisco. There he collected on local history a library of sixty thousand volumes and copies of documents which he and assistants used in writing *The Native Races of the Pacific States* (5 vols.); *History of the Pacific States* (34 vols.); *Chronicles of the Builders of Commonwealths* (7 vols.), and other works.

Ban'croft, RICHARD, born in Lancashire 1544, died 1610, studied at Cambridge, entered the church, and rose rapidly during the reign of Elizabeth till he obtained the see of London in 1597. James I made him Archbishop of Canterbury on the death of Whitgift. He suppressed the Puritans mercilessly, and they in return never ceased to abuse him.

Bandage (ban'dāj), a surgical wrapper of some kind applied to a limb or other portion of the body to keep parts in position, exert a pressure, or for other purpose. To be able to apply a bandage suitably in the case of an accident is a highly useful accomplishment, which, through the teaching of ambulance surgery now so common, may be easily acquired.

Banda (ban'da) ISLANDS, a group belonging to Holland, in the Indian Archipelago, south of Ceram, Great Banda, the largest, being 12 miles long by 2 broad. They are beautiful islands of volcanic origin, yielding quantities of nutmeg and mace. Goenong Api, or Fire Mountain, is a cone-shaped volcano which rises 2320 feet above the sea. Pop. about 8000.

Bandanna (ban-dan'a), a variety of silk handkerchief having a uniformly dyed ground, usually of bright red or blue, ornamented with white or yellow circular, lozenge-shaped, or other simple figures produced by discharging the ground color.

Banda Oriental. See *Uruguay.*

Bandello (b a n-d e l'l ō), MATTEO, an Italian writer of *novelle* or tales, born about 1480, died about 1562. He was, in his youth, a Dominican monk, and having been banished from Italy as a partisan of the French, Henry II of France gave him in 1550 the bishopric of Agen. He resided in Agen up to the time of his death, devoting himself largely to literary pursuits which mainly were bent toward the completion of his *novelle.* He also wrote poetry, but his fame rests on his *novelle,* which are in the style of Boccaccio, and have been made use of by Shakespere, Massinger, and Beaumont and Fletcher.

Bande Noire (bänd nwär), the name given when the Revolution in France had entailed the confiscation of much ecclesiastical property, also many castles and residences of the emigrant and resident nobility, to a number of speculators who bought up the edifices.

etc., in order to demolish them and turn their materials to profit. They were so called on account of their disregard of sacred property, of art, antiquity, and historical associations.

Band-fish, the popular name of fishes of the genus *Cepŏla*, from their long, flat, thin bodies. *C. rubescens*, a very fragile creature, is sometimes cast up on British shores. Also called *Snake-fish, Ribbon-fish.*

Bandicoot (ban'di-köt), the *Mus gigantēus*, the largest known species of rat, attaining the weight of 2 or 3 lbs., and the length, including the tail, of 24 to 30 inches. It is a native of India, and is very abundant in Ceylon. Its flesh is said to be delicate and to resemble young pork, and is a favorite article of diet with the coolies. It is destructive to rice fields and gardens.—The name is also given to a family of Australian marsupials. The most common species (*Peramĕles nasūta*), the long-nosed bandicoot, measures about 1½ feet from the tip of the snout to the origin of the tail, and in general appearance bears a considerable resemblance to a large overgrown rat.

Bandinelli (bān-de-nel'lē), Baccio, an Italian sculptor, born at Florence in 1493; died there in 1560. He was jealous of and strove to rival Michael Angelo. Among his works are a *Hercules and Cacus, Christ's body held up by an Angel, Adam and Eve*, etc.

Ban'dit, Italian *bandito*, originally an *exile*, banished man, or outlaw, and hence, as persons outlawed frequently adopted the profession of brigand or highwayman, the word came to be synonymous with brigand, and is now applied to members of the organized gangs which infest some districts of Italy, Sicily, Spain, Greece, and Turkey.

Bandoleer (ban'dō-lēr), a large leathern belt or baldrick, to which were attached a bag for balls and a number of pipes or cases of wood or metal covered with leather, each containing a charge of gunpowder. It was worn by ancient musketeers and hung from the left shoulder under the right arm with the ball bag at the lower extremity, and the pipes suspended on either side. The name is sometimes given to the small cases themselves, now superseded by cartridges. In modern military equipment a shoulder belt for holding cartridges.

Bandong, or Bandung, a town in Java; capital of the province Preanger Regencies. Pop. 21,000.

Bandon, a town of Ireland, County Cork. Pop. 2800.

Bands, a small article of clerical dress made of linen going round the neck and hanging down in front for a short distance in two pieces with square ends, supposed to be a relic of the amice.

Baneberry (bān'ber-i), *Actæa spicāta*, a European plant, order *Ranunculaceæ*, local in England, with a spike of white flowers and black, poisonous berries. Two American species are considered remedies for rattlesnake bite.

Baner (bå-når'), Johan Gustafsson, a Swedish general in the Thirty Years' war, born in 1596; died in 1641. He made his first campaigns in Poland and Russia, and accompanied Gustavus Adolphus, who held him in high esteem, to Germany, and commanded the right wing in the memorable battle of Leipzig. After the death of Gustavus in 1632 he was made commander-in-chief of the Swedish army, and in 1634 invaded Bohemia, defeated the Saxons at Wittstock, 24th September, 1636, and took Torgau. He ravaged Saxony again in 1639, gained another victory at Chemnitz, and subsequently, by repeated successes, overran and laid waste a great part of Germany. In the year of his death he nearly took Ratisbon by surprise.

Banff (bamf), county town of Banffshire, Scotland, a seaport on the Morav Firth at the mouth of the Deveron. It is well built, carries on some shipbuilding, and has a rope and sail works, a brewery, etc., with a fishing and shipping trade. On the east side of the Deveron is the town of Macduff, where an extensive fishing trade is carried on. Pop. 7148.—The county has an area of 641 sq. miles. In the south it is mountainous; but the northern part is comparatively low and fertile; principal rivers, the Spey and Deveron; principal mountains, Cairngorm (4095 ft.) and Ben Macdhui (4296 ft.), on its southern boundary. Little wheat is raised, the principal crops being barley, oats, turnips, and potatoes. Fishing is an important industry; as is also the distilling of whisky. Cattle breeding is the principal industry. Serpentine abounds in several places, especially at Portsoy, where it is known as 'Portsoy marble,' and Scotch topazes or cairngorm stones are found on the mountains in the south. Pop. 61,500.

Banff (banf), a station on the Canadian Pacific R. R. in S. W. Alberta and in the Rocky Mountain National Park of Canada. It is a health and pleasure resort with magnificent scenery, a boiling sulphur spring, open air swimming pools, and sanatorium.

Bang. See *Hashish.*

Bangalore (bang-ga-lōr′), a town of Hindustan, capital of Mysore, and giving its name to a considerable district in the east of Mysore state. The town stands on a healthy plateau 3000 feet above sea-level, has a total area of nearly 14 square miles and is one of the pleasantest British stations in India. In the old town stands the fort, reconstructed by Hyder Ali in 1761, and taken by Lord Cornwallis in 1791. Under English administration the town has greatly prospered in recent times. There are manufactures of silks, cotton cloth, carpets, gold and silver lace, etc. Pop. 189,485. The Bangalore district has an area of nearly 3000 square miles, of which more than half represents cultivable land.

Bangkok, or BANKOK (bang-kok′), the capital of the kingdom of Siam extending for several miles on both sides of the Menam, which falls into the Gulf of Siam about 15 miles below. The inner city occupies an island surrounded with walls and bastions, and contains the palace of the king and other important buildings. The dwellings of the common people are of wood or bamboo, often raised on piles; a large portion of the population, however, dwells in boats or wooden houses erected on bamboo rafts moored in the river, and forming a floating town. Temples are numerous and lavishly decorated. Houses in the European style are beginning to be erected, and among other advances recently made are the introduction of the telegraph and telephone, gas, fire-engines, and trolley cars. The trade, both inland and foreign, is very extensive, the exports consisting chiefly of rice, sugar, silk, cotton, tobacco, pepper, sesame, ivory, aromatic wood, cabinet woods, tin, hides, etc.; and the imports consisting chiefly of British cotton, woolen, and other goods. Pop. according to the last census report, 628,675, of whom about a half are Chinese.

Bangles (bang′gls), ornamental rings worn upon the arms and ankles in India and Africa.

Bangor (bang′gor), a city of North Wales, in Carnarvonshire, picturesquely situated near the northern entrance of the Menai Strait. It appears to have possessed a cathedral in the 6th century, though the present cathedral—the third—only dates from the reign of Henry VII. There is also a university college. Since the construction of the Menai bridge Bangor has risen into some importance as a popular resort; its principal trade is in the export of slates from the neighboring quarries. Pop. (1911) 11,237, (1921) 11,032.

Bangor, a seaport and watering place of Ireland, County Down, on the south side of Belfast Lough. Principal trade: cotton, linen and embroideries. Pop. 7800.

Bangor, a city, port of entry, and county seat of Penobscot Co., Maine, on Penobscot River; the commercial and banking center of E. and N. Maine, with good railroad and steamer service. Lumbering and pulp interests center here. Seat of Bangor Theological Seminary (Congregational) and University of Maine Law School. It was visited by Champlain in 1605. Pop. (1910) 24,803; (1920) 25,978.

Bangor, a borough of Northampton Co., Pennsylvania, in the Blue Ridge Mountains, 16 miles N. of Easton. It is the center of the slate industry, also has silk mills, glove and casket manufactures, flour mills, lumber mills, etc. Pop. (1920) 5402.

Bangs, JOHN KENDRICK, an American humorist, born at Yonkers, N. Y., May 27, 1862; died January 21, 1922. He was on the editorial staff of *Life*, *Harper's*, *Metropolitan*, *Puck* and other magazines. He wrote *Coffee and Repartee*, *The Idiot*, *House Boat on the Styx*, *From Pillar to Post*, etc.

Bangweolo (bang-wē-ō′lō), LAKE, in Central Africa, one of the great lake reservoirs of the Congo, discovered by Livingstone in 1868.

Banian (ban′yan), an Indian trader or merchant, one engaged in commerce generally, but more particularly one of the great traders of Western India, as in the seaports of Bombay, Kurrachee, etc., who carry on a large trade by means of caravans with the interior of Asia, and with Africa by vessels. They form a class of the Vaisya caste, wear a peculiar dress, and are strict in the observance of fasts; they are vegetarians.

Banim (bā′nim), JOHN, an Irish novelist, dramatist and poet, born 1798; died in 1842. His chief early work was a poem, *The Celt's Paradise* (1821). Having settled in London, he made various contributions to magazines and to the stage; but his fame rests on his novels, particularly the *O'Hara Tales*, in which Irish life is admirably portrayed. In these, as in some of his other publications, his brother, Michael Banim (born 1796; died 1874), had an important share, if not an equal claim to praise.

Banishment (ban′ish-ment). See *Exile.*

Banjarmassin (bån-jer-mås'in), a district and town in the southeast of Borneo, under the government of the Dutch. The town is situated on the Martapura River, about 14 miles above its mouth, in a marshy locality, the houses being built on piles, and many of them on rafts. Exports: pepper, gold dust, precious stones, rattan, dragon's-blood, bird's-nests, etc.; imports: rice, salt, sugar, opium, etc. Pop. about 40,000.

Banjo (ban-jō; a negro corruption of *bandore*, It. *pandora*, from L., *pandura*, a three-stringed instrument), the favorite musical instrument of the negroes of the southern United States. It has five to nine strings, a body like a tambourine and a neck like a guitar, and is played by stopping the strings with the fingers of the left hand and twitching or striking them with the fingers of the right. The upper or octave string, however, is never stopped.

Banjo.

Banjoemas (bån'yö-mås), a town in Java, near the center of the island, well built and of commercial importance; it is 22 miles from the coast, and is the residence of a Dutch governor. Pop. about 6000.

Bank, primarily an establishment for the deposit, custody, and repayment on demand of money; and obtaining the bulk of its profits from the investment of sums thus derived and not in immediate demand. The term is a derivative of the *banco* or bench of the early Italian money dealers, being analogous in its origin to the terms *trapezītai* (*trapeza*, a bench or table) applied to the ancient Greek money-changers, and *mensarii* (*mensa*, a table) applied to the public bankers of Rome.

In respect of constitution there is a broad division of banks into public and private; public banks including such establishments as are under any special state or municipal control or patronage, or whose capital is in the form of stock or shares which are bought and sold in the open market; private banks embracing those which are carried on by one or more individuals without special authority or charter and under the laws regulating ordinary trading companies. In respect of function three kinds of banks may be discriminated: (1) banks of deposit merely, receiving and returning money at the convenience of depositors; (2) banks of discount or loan, borrowing money on deposit and lending it in the discount of promissory notes, bills of exchange, and negotiable securities; (3) banks of circulation or issue, which give currency to promissory notes of their own, payable to bearer and serving as a medium of exchange within the sphere of their banking operations. The more highly organized banks discharge all three functions, but all modern banks unite the two first. For the successful working of a banking establishment certain resources other than the deposits are of course necessary, and the subscribed capital, that is the money paid up by shareholders on their shares and forming the substantial portion of their claim to public credit, is held upon a different footing to the sums received from depositors. It is usually considered that for sound banking this capital should not be traded with for the purpose of making gain in the same way as the moneys deposited in the bank; and it is for the most part invested in government or other securities subject to little fluctuation in value and readily convertible into money. But in any case prudence demands that a *reserve* be kept sufficient to meet all probable requirements of customers in event of commercial crises or minor panics. The reserve of the banking department of the Bank of England is always in coin, or in notes against which an equivalent value of coin and bullion is lying in the issue department. In other English banks the reserve is usually kept partly in gold and partly in government stocks and Bank of England notes; but it sometimes lies as a deposit in the Bank of England. The working capital proper of a bank is constituted by moneys on deposit, for which the bank may or may not pay interest; the advantages of security, of ease in the transmission of payments, etc., being regarded in the cases of banks little affected by competition as a sufficient return to the depositor. Thus the Bank of England pays no interest on deposits, while the contrary practice has prevailed in Scotland since 1729 and is now common in the United States.

Of the methods of making profit upon the money of depositors, one of the most common is to advance it in the discounting of bills of exchange not having long periods (seldom more than 3 months with the national banks) to run; the banker receiving the amounts of the bills from the acceptors when the bills arrive at maturity. Loans or advances are also often made by bankers upon exchequer bills or other government securities, on

railway debentures or the stock of public companies of various kinds, as well as upon goods lying in public warehouses, the dock-warrant or certificate of ownership being transferred to the banker in security. In the case of a well-established credit they may be advanced upon notes of hand without other security. Money is less commonly advanced by bankers upon mortgages on land, in which the money loaned is almost invariably locked up for a number of years. To banks of issue a further source of profit is open in their note circulation, inasmuch as the bank is enabled to lend these notes, or promises to pay, as if they were so much money and to receive interest on the loan accordingly, as well as to make a profitable use of the money or property that may be received in exchange for its notes, so long as the latter remain in circulation. It is obvious, however, that this interest on its loaned notes may not run over a very extended period, in that the person to whom they are issued may at once return them to the bank to lie there as a deposit and so may actually draw interest on them from the bank of issue; or he may present them to be exchanged for coin, or by putting them at once into circulation may ensure a certain number speedily finding their way back through other hands or other banks to the establishment from which he received them. A considerable number of the notes issued will, however, be retained in circulation at the convenience of the public as a medium of exchange; and on this circulating portion a clear profit accrues. This rapid return of notes through other banks, etc., in exchange for portions of the reserve of the issuing bank, is one of the restraints upon an issue of notes in excess of the ability of the bank to meet them.

In specific relation to his customer the banker occupies the position of debtor to creditor, holding money which the customer may demand at any time in whole or in part by means of a check payable at sight on presentation during banking hours. For the refusal to cash a check from the erroneous supposition that he has no funds of his customer's in his hands, or for misleading statements respecting the position in which the bank stands, the banker is legally responsible. Moreover, the law regards him as bound to know his customer's signature, and the loss falls upon him in event of his cashing a forged check. In their relations to the community, the chief services rendered by banks are the following:—By receiving deposits of money, and massing in sums efficient for extensive enterprises the smaller savings of individuals, they are the means of keeping fully and constantly employed a large portion of the capital of the community which, but for their agency, would be unproductive; they are the means by which the surplus capital of one part of a country is transferred to another where it may be advantageously employed in stimulating industry; they enable vast and numerous money transactions to be carried on without the intervention of coin or notes at all, thus obviating trouble, risk, and expense.

Although banking operations on a considerable scale appear to have been conducted by the ancients, modern banking must be regarded as having had an independent origin in the reviving civilization of the middle ages. In the twelfth century almost the whole trade of Europe was in the hands of the Italian cities, and it was in these that the need of bankers was first felt. The earliest public bank, that of Venice, established in 1171 and existing down to the dissolution of the republic in 1797, was for some time a bank of deposit only, the government being responsible for the deposits, and the whole capital being in effect a public loan. In the early periods of the operations of this bank deposits could not be withdrawn, but the depositor had a credit at the bank to the amount deposited, this credit being transferable to another person in place of money payment. Subsequently deposits were allowed to be withdrawn, the original system proving inconvenient outside the Venetian boundaries. It was, however, less from the Bank of Venice than from the Florentine bankers of the 13th and 14th centuries that modern banking specially dates, the magnitude of their operations being indicated by the fact that between 1430 and 1433, 76 bankers of Florence issued on loan nearly 5,000,000 gold florins. The Bank of St. George at Genoa also furnished a striking chapter in financial history. The important Bank of Amsterdam, taken by Adam Smith as a type of the older banks, was established in 1609, and owed its origin to the fluctuation and uncertainty induced by the clipped and worn currency. The object of the institution (established under guarantee of the city) was to give a certain and unquestionable value to a bill on Amsterdam; and for this purpose the various coins were received in deposit at the bank at their real value in standard coin, less a small charge for recoinage and expense of management. For the amount deposited a

credit was opened on the books of the bank, by the transfer of which payments could be made, this so-called *bank money* being of uniform value as representing money at the mint standard. It bore, therefore, an *agio* or premium above the worn coin currency, and it was legally compulsory to make all payments of 600 guilders and upwards in bank money. The deposits were supposed to remain in the coffers of the bank, but they were secretly traded with in the 18th century till the collapse of the bank in 1790. Banks of similar character were established at Nuremberg and other towns, the most important being the bank of Hamburg, founded in 1619. In England there was no corresponding institution, the London merchants being in the habit of lodging their money at the Mint in the Tower, until Charles I appropriated the whole of it (£200,000) in 1640. Thenceforth they lodged it with the goldsmiths, who began to do banking business in a small way, encouraging deposits by allowing interest (4*d.* a day) for their use, lending money for short periods, discounting bills, etc. The bank-note was first invented and issued in 1690 by the Bank of Sweden, founded by Palmstruck in 1688, and one of the most successful of banking establishments. About the same time the banks of England and Scotland began to take shape, opening up a new era in the financing of commerce and industry.

The Bank of England, the most important banking establishment in the world, was projected by William Paterson, who was afterwards the promoter of the disastrous Darien scheme. It was the first public bank in the United Kingdom, and was chartered in 1694 by an act which, among other things, secured certain recompenses to such persons as should advance the sum of £1,500,000 towards carrying on the war against France. Subscribers to the loan became, under the act, stockholders, to the amount of their respective subscriptions, in the capital stock of a corporation, denominated the *Governor and Company of the Bank of England.* The company thus formed, advanced to the government £1,200,000 at an interest of 8 per cent—the government making an additional bonus or allowance to the bank of £4000 annually for the management of this loan (which, in fact, constituted the capital of the bank), and for settling the interest and making transfers, etc., among the various stockholders. This bank, like that of Venice, was thus originally an engine of the government, and not a mere commercial establishment. Its capital has been added to from time to time, the original capital of £1,200,000 having increased to £14,553,000 ($72,765,000) in 1800, since which no further augmentation has taken place.

The other English banks consist of numerous joint-stock and private banks in London and the provinces, many of the provincial establishments of both kinds having the right to issue notes. Private banks in London with not more than six partners have never been prevented from issuing notes, but they could not profitably compete with the Bank of England.

Of all other banks, the Bank of France is second in importance only to the Bank of England. It was established in the beginning of the nineteenth century, at first with a capital of 45,000,000 francs, and with the exclusive privilege in Paris of issuing notes payable to bearer, a privilege which was extended in 1848 to cover the whole of France. It has numerous branches in the larger towns, a number of these having been acquired in 1848, when certain joint-stock banks of issue were by government decree incorporated with the Bank of France, the capital of which was then increased to 91,250,000 francs ($18,250,000) in 91,250 shares of 1000 francs each. In 1857 the capital was doubled, and besides this it has a large surplus capital or rest. Like the Bank of England, it is a bank of deposit, discount, and circulation, and is a large creditor of the state.

The history of banking in the United States properly begins with the establishment of the First Bank of the United States, chartered by Congress in 1791, although a few banks had previously been established by private efforts. The First Bank of the United States, with an authorized capital of $10,000,000, one-fifth subscribed by the Government, had the power to issue notes which were receivable for all payments to the United States Government. The bank served as agent in Government transactions, and frequently made up deficits in revenues by loans. The Bank was not rechartered in 1811, and its business fell to the state banks, which were eighty-eight in number at that time. These banks rapidly multiplied, but were often constructed on such unsound principles, that they gained the name of 'wild cat' banks. Sometimes the amount of currency was twice and even three times the amount of capital. In the meantime the Second Bank of the United States had been established in 1815, with a fixed capital of $35,000,000, one-fifth subscribed by the Government. This, too, failed to receive a new charter after the expiration of twenty years.

A panic in 1837 resulted in general im-

provement in banking methods and the bank note circulation shrank from $149,000,000 in 1837 to $58,000,000 in 1843. In 1863 Congress enacted a law authorizing the formation of a system of banks under federal charter. This act was recast in an act of June 3, 1864, upon which the national banking system rested for nearly fifty years. Every bank chartered under the act was required to invest a certain proportion of its capital in United States registered bonds, at least 25 per cent. if the capital exceeded $150,000, 33 1-3 per cent. if less. No bank was originally permitted to be organized with a capital of less than $50,000; but this provision was amended in 1900 to permit the organization of banks with a capital of less than $25,000 in towns having a population of not more than 3000. On March 3, 1865, a tax of 10 per cent. per annum was inforced on all issues of state banks outstanding after July 1, 1866; and many state banks thereafter were re-organized as national banks or ceased issuing notes. The Act of 1900 permitted banks to issue notes to the par value of bonds deposited in the United States treasury, instead of to 90 per cent. value as originally. The limit of the total circulation of the country to $300,000,000 was early abandoned; and the removal of the restriction led to the establishment of more and more banks. The increased use of checks later caused a steady decrease in the amount of bills in circulation, while the high price of U. S. bonds so reduced the interest as to make it unprofitable to hold them as a reserve to secure circulation.

While the national bank currency combined the advantages of uniformity with security to the noteholder, it proved too inelastic to meet the needs of expanding business. The currency bill passed by the Democratic administration of President Wilson, December 23, 1913, provided, broadly speaking, for a return to the original system of a Government-controlled bank, providing for Federal reserve banks (not fewer than eight or more than twelve), controlled by a body of seven men selected by the President, including the Secretary of the Treasury and the Comptroller of the Currency, members *ex-officio*.

The bill further provided: (1) that each reserve bank should have a capital as large as should be required, and not less than $4,000,000, this capital to be subscribed by the national banks (each to purchase stock to the amount of 6 per cent. of its combined capital and surplus or to forfeit its national charter), offered at par in shares of $100 to the public, or, both of these sources of capital failing, purchased by the United States; (2) that each should have nine directors—three bankers, to be chosen from among the bankers themselves, three, not bankers, to be chosen by the bankers in the district, but representing the agricultural interests of the district, and three to be selected by the Federal Board in Washington; (3) that the banks should be simply *reserve* banks, issuing money (bank notes in denominations of $5 and upward, to be legal tender and accepted for the payment of any debt), but not dealing directly with the public; and (4) that they should be depositories for the nation's cash. National banks for fifty years had issued notes based upon United States Government bonds; but now Federal bank notes must be based upon two-name commercial paper, discounted previously by individual banks. Behind each note there must be 100 per cent. of such paper and an additional gold reserve of 40 per cent. From its seat in Washington the Federal Reserve Board controls the Federal reserve banks and through them the national banks throughout the United States. A distinctive feature of the new system is that any bank not located in any of the existing fifty reserve or central reserve cities, may lend money on farm property up to 50 per cent. of its capital—such loans to be made for a period not longer than five years.

Since 1861 post-office savings-banks have been in operation in Britain; the deposits are paid over to the Commissioners for the Reduction of the National Debt, who allow interest at 2½ per cent. per annum. A similar bill was passed by Congress in 1910, interest being fixed at 2 per cent, and the limit of deposit as $500. France, Austria, Germany, Canada and other countries have also adopted similar savings-banks.

Savings-banks began to attract attention in the United States shortly after their inauguration in England, the first being organized in New York in 1816, but the first one to go into practical operation was in Philadelphia in the same year. Boston was the first to have an incorporated savings-bank, this being effected Dec. 13, 1816, business being begun in 1817; the United States thus anticipated Britain in throwing about these banks the protection and sanction of law. From that time these examples have been rapidly followed. No uniform plan of organization for these banks exists. In some States there is a large number of incorporators who elect trustees and directors from among their members; in others the corporators are limited in number and are themselves the trustees and managers. In the Northeast trustees manage the savings-bank

for the depositors; elsewhere they are mostly under the control of corporations with capital stock.

The original theory of savings-banks was that the earnings, after the repayment of expenses, should be ratably distributed among the depositors. Afterward this was supplemented by the reserving of a sum for the meeting of any losses which might occur, begetting a surplus as security. Still later has grown a practice of paying a given rate of interest, but this is a departure from the real principle of savings-banks. Many of these institutions give a further dividend in addition to the stated interest, according as the dividend term has been prosperous or otherwise. In general the deposits, though there is much diversity in the several States, are invested in real estate securities, United States bonds, the stock of corporations of unquestioned credit, the bonded obligations of cities and railroads and other securities and on loans thereon. In most of the States there is legal restriction on the amounts which may be deposited, but these are generally loosely enforced.

In Canada and Australia the bank system is largely under government management, and this is especially the case in New Zealand, although these countries also have a number of private institutions, all of which, however, are subject to stringent laws. A number of the ordinary banks also perform to a large degree the functions of savings-banks.

In France the savings-banks system arose in 1818, but it was not until 1835 that the banks were regulated by law. Since that time their advancement has been rapid, and enormous amounts now stand on deposit, the postoffice savings banks doing the greater share of the business.

There are also dime savings-banks. School savings-banks, besides, have been largely introduced through the United States, and much good has resulted by the teaching of thrift among scholars. There are other institutions in many of the large cities which promote savings by giving a considerable bonus if the deposits are allowed to remain for a certain period, but these, of course, are charitable institutions and not within the scope of this article.

An important feature in connection with the banking system is that of the *clearing-house*, which, in the United States, was first put in operation in New York, Oct. 11, 1853. Since that time this plan has been adopted in every important money center and city. Each bank in its daily dealings receives large amounts of, and checks on, other banks; thus, at the close of the day's business each one has various sums due it by other banks; it is likewise the debtor of other banks who have received bills, checks, and drafts drawn upon it. The settlement by means of the clearing-house is simultaneously and quickly effected, the banks now having no direct business with each other save through this medium, which enables them to settle with each other every day. The close relation between the several banks thus instituted enables them to act in co-operation in times of financial stress.

In 1861 it is doubtful if the government could have effected the necessary loans at the outbreak of the Civil War but for the aid of the banks of New York. Certainly without the Clearing-house Association the banks could not have furnished the funds which established the credit of the United States and enabled it to negotiate its bonds to the enormous amount of $2,000,000,000.

A record is kept by the clearing-house staff of the daily transactions of each bank, together with a statement of the loans, specie, deposits, legal tender and circulation made weekly to the manager of the clearing-house; thus the condition of each bank can be accurately estimated. See *Clearing-house*, *Postal Savings Banks*.

Banking. An amendment to the federal reserve act permits the board to authorize the banks to purchase acceptances in quantities more than 50 per cent., but not more than 100 per cent. of the capital and surplus of the banks. The previous regulations limited the amount to 50 per cent.

Banko-ware (ban'ko-wār), a Japanese pottery made near Kuwana. It is very light, and is made in molds of irregular shapes and decorated with enamel colors, etc.

Bankrupt (bangk'rupt; from It. *banca*, a bench, and Lat. *ruptus*, broken, in allusion to the benches formerly used by the money-lenders in Italy, which were broken in case of their failure), a person whom the law does or may take cognizance of as unable to pay his debts. Properly it is of narrower signification than *insolvent*, an insolvent person simply being unable to pay all his debts. In England up till 1861 the term bankrupt was limited to an insolvent trader, and such traders were on a different footing from other insolvent persons, the latter not getting the same legal relief from their debts. In all civilized communities laws have been passed regarding bankruptcy. At present bank-

ruptcy in England is regulated by the Bankruptcy Act of 1883, which has as its essential feature the intervention of the Board of Trade at all stages of the bankruptcy, with the object of obtaining full official supervision and control.

Though imprisonment for debt has been abolished, fraudulent bankrupts may be punished, and the conduct of prosecutions for offenses arising out of any bankruptcy proceeding falls to the public prosecutor. The estates of persons dying insolvent may be administered according to the law of bankruptcy.

In the United States, by an act approved July 1, 1898, a national Bankruptcy Law is in effect. It much resembles the English law, except that referees are substituted for receivers and are appointed by the court having jurisdiction in the district. All U. S. District Courts are constituted Courts of Bankruptcy. A person may file a petition for voluntary bankruptcy, if his debts amount to one thousand dollars. Creditors may file a petition for involuntary bankruptcy against a debtor and on the latter rests the onus of defense in proving his solvency. In such a case the debtor can claim the right of a trial by jury. The referee shall declare dividends and furnish lists to whom such are payable, to the trustee, the latter having possession of the estate in liquidation and being also a court appointee. Meetings of creditors are to be called by the court to be held in not less than 10 nor more than 30 days after adjudication, and at which meeting the bankrupt shall be present.

Banks, SIR JOSEPH, a distinguished naturalist, born at London in 1743. After studying at Harrow and Eton he went to Oxford in 1760, and formed there amongst his fellow-undergraduates a voluntary class in botany, etc. He was chosen a member of the Royal Society in 1766, and soon after went to Newfoundland and Hudson Bay to collect plants. In 1768, with Dr. Solander, a Swedish gentleman, pupil of Linnæus, and then assistant librarian at the British Museum, he accompanied Cook's expedition as naturalist. In 1772 he visited Iceland along with Dr. Solander, and during this voyage the Hebrides were examined, and the columnar formation of the rocks of Staffa first made known to naturalists. In 1778 Banks was chosen president of the Royal Society, in 1781 was made a baronet, and in 1795 received the order of the Bath. He wrote only essays, papers for learned societies, and short treatises. He died 1820, and bequeathed his collections to the British Museum.

Banks, THOMAS, an English sculptor, born in 1735, died in 1805. He studied sculpture in the Royal Academy, and in Italy, where he executed several excellent pieces, particularly a bas-relief representing *Caractacus brought prisoner to Rome*, and a *Cupid catching a Butterfly*, the latter work being afterwards purchased by the Empress Catharine. On leaving Italy he spent two unsatisfactory years in Russia, and ther returned to England, where he was soon after made an academician. Among his other works was a colossal statue of *Achilles Mourning the Loss of Briseis*, in the hall of the British Institution, and the monument of Sir Eyre Coote in Westminster Abbey.

Banks, NATHANIEL PRENTISS, soldier and statesman, born at Waltham, Massachusetts, in 1816. Elected to the State legislature in 1849 and to Congress in 1852, he was made speaker of the House in 1856, and elected governor of Massachusetts in 1857, being twice re-elected. In 1861 he was made major-general of volunteers in the Civil War, and in 1862 was appointed commander of the Department of the Gulf. He captured Port Hudson in 1863, but an expedition against Shreveport, on the Red River, in 1864, proved a failure. He was subsequently a member of Congress from 1865 to 1877, 1888–91. He died in 1894.

Banksia (bank'si-a), a genus of the *Proteaceæ*, an Australian order of plants, named in honor of Sir Joseph Banks. While chiefly shrubs, a few species are small trees. They have hard, dry leaves, white or very pale green beneath, while the branches bear at their ends oblong heads of flowers, grouped in great numbers, and secreting much honey. They are abundant in all parts of Australia, called there Honeysuckle trees, and forming a characteristic feature of the vegetation.

Banksring. See *Banxring.*

Bank-Swallow, a common bird of Europe, Asia and America, family *Hirundinidæ;* so called from its habit of burrowing into banks to build its nest.

Bankura (ban-kö'ra), a town of Bengal, on the Dhalkisor River, healthy and with a considerable trade. Pop. about 20,000.

Bann, UPPER and LOWER, two rivers in the N. of Ireland, the former rising in the mountains of Mourne, County Down, and after flowing 38 miles in a N. direction, falling into Lough Neagh; the latter being the outlet of Lough Neagh, and falling into the Atlantic Ocean 4 miles below Coleraine, after a course of nearly 40 miles.

Ban'ner, a piece of drapery, usually bearing some warlike or heraldic device or national emblem, attached to the upper part of a pole or staff, and indicative of dignity, rank, or command. Heraldically it is a square or quadrangular flag which varies in size with the rank of its possessor; and it is sometimes used specifically to denote an ensign, the attached edge of which is maintained in a horizontal position, as distinguished from the flag, which is fastened vertically to an upright.

Banneret (ban'er-et), formerly, in England, a knight made on the field of battle as a reward for bravery, with the ceremony of cutting off the point of his pennon and making it a banner.

Bannock (ban'ok), a cake made of oatmeal, barleymeal, or peasemeal baked on an iron plate or griddle over the fire. From a supposed resemblance the turbot is sometimes called in Scotland the *Bannock-fluke*.

Bannockburn (ban'ok-burn), a village of Scotland, in Stirlingshire, 2 miles S. E. of Stirling, famous for the decisive battle in which King Robert Bruce of Scotland defeated Edward II of England, on the 24th June, 1314. It has manufactures of woolens, such as tartans, carpets, etc. Pop. 3374.

Banns of Matrimony, public notice of the intended celebration of a marriage given either by proclamation, *viva voce*, by a clergyman, session-clerk, or precentor in some religious assembly, or by posting up written notice in some public place.

Bannu (bän'nö), district in the Punjab, Hindustan, on the northwestern frontier; area, 1680 miles; pop. 235,000, largely Mohammedans.

Banquette (bang-ket'), in fortification, the elevation of earth behind a parapet, on which the garrison or defenders may stand. The height of the parapet above the banquette is usually about 4 feet 6 inches; the breadth of the banquette from 2½ or 3 feet to 4 or 6 feet according to the number of ranks to occupy it. It is frequently made double, that is, a second is made still lower.

Bans. See *Banns*.

Banshee (ban'shē), BENSHI', a phantom hag believed in Ireland and some parts of Scotland to attach herself to a particular house, and to appear or make her presence known by wailing before the death of one of the family.

Bantam, a residency occupying the whole of the W. end of the island of Java. It formed an independent kingdom, governed by its own sultan, till 1683, and the Dutch exercised suzerainty with brief intermission until its formal incorporation by them at the beginning of the last century. It produces rice, coffee, sugar, cinnamon, etc. Serang is its capital. The town Bantam was the first Dutch settlement in Java (1595), and for some time their principal mart, though now greatly decayed.

Banteng (ban-teng'; *Bos Banteng* or *Sondacius*), a wild species of ox, native of Java and Borneo, having a black body, slender white legs, short sleek hair, sharp muzzle and the back humped behind the neck.

Banting System, a course of diet for reducing superfluous fat, adopted and recommended in 1863 by W. Banting, of London. The diet recommended was the use of butcher-meat principally, and abstinence from beer, farinaceous food, and vegetables.

Bantry, a small seaport town near the head of Bantry Bay, County Cork, Ireland.—The *bay*, one of three large inlets at the S. W. extremity of Ireland, affords an unsurpassed anchorage, and is about 25 miles long by 4 to 6 broad, and from 10 to 40 fathoms deep, with no dangerous rocks or shoals.

Bantu (bän-tö'), the ethnological name of a group of African races below about 6° N. latitude, and including the Kaffirs, Zulus, Bechuanas, the tribes of the Loango, Congo, etc., but not the Hottentots.

Banville (boṇ-vēl') THEODORE FAULLAIN DE, French poet and miscellaneous writer, was born in the Bourbonnais in 1823, the son of a naval officer. He received his education at a lycée in Paris, and on leaving school gave himself up to literature. In 1842 he published *Les Cariatides*, and this, followed in 1846 by *Les Stalactites*, won him a place in the literary world. He wrote a number of plays and was identified with Parisian journalism. Died in 1891.

Banxring (banks'ring; genus *Tupaia*), a quadruped belonging to the *Insectivora*, inhabiting the Indian Archipelago, bearing some resemblance externally to a squirrel, but having a long, pointed snout. It lives among trees, which it ascends with great agility.

Banyan, or BAN'IAN (*Ficus Indica*), a tree of India, of the fig genus. A remarkable characteristic of this tree is its method of throwing out from the horizontal branches supports which take root as soon as they reach the ground, enlarge into trunks, and, extending branches in their turn, in time cover a prodigious extent of ground. A cele-

brated banyan-tree has been known to shelter 7000 men beneath its shade. The wood is soft and porous, and from its white glutinous juice bird-lime is sometimes prepared. Both juice and bark are regarded by the Hindus as valuable medicines.

Baobab (bā'ō-bab; *Adansonia digitāta*, or MONKEY-BREAD TREE, a tree belonging to the natural order (or suborder) Bombaceæ, and the only known species of its genus, which was named after the naturalist Adanson. It is one of the largest of trees, its trunk sometimes attaining a diameter of 30 feet; and as the profusion of leaves and drooping boughs sometimes almost hides the stem, the whole forms a hemispherical mass of verdure 140 to 150 ft. in diameter and 60 to 70 ft. high. It is a native of Western Africa, and is found also in Abyssinia; it is cultivated in many of the warmer parts of the world. The roots are of extraordinary length, a tree 77 feet in girth having a tap-root 110 feet in length. The leaves are deep green, divided into five unequal parts lanceolate in shape, and radiating from a common center. The flowers resemble

Baobab Tree (*Adansonia digitāta*).

the white poppy, having snowy petals and violet-colored stamens; and the fruit, which is large and of an oblong shape, is said to taste like gingerbread, with a pleasant acid flavor. The wood is pale-colored, light, and soft. The tree is liable to be attacked by a fungus, which, vegetating in the woody part, renders it soft and pithlike. By the negroes of the west coast these trunks are hollowed into chambers, and dead bodies are suspended in them. There they become perfectly dry and well preserved, without further preparation or embalming. The baobab is emollient and mucilaginous; the pulverized leaves constitute *lalo*, which the natives mix with their daily food to diminish excessive perspiration, and which has been used by Europeans in fevers and diarrhœas. The expressed juice of the fruit is used as a cooling drink in putrid fevers, and also as a seasoning for various foods.

Baphomet (baf'ō-met), the imaginary idol or symbol which the Templars were accused of employing in their mysterious rites, and of which little or nothing is known.

Baptism (bap'tizm; from the Greek *baptizō*, from *baptō*, to immerse or dip), a rite which is generally thought to have been usual with the Jews even before Christ, being administered to proselytes. From this baptism, however, that of St. John the Baptist differed, because he baptized Jews also as a symbol of the necessity of perfect purification from sin. Christ himself never baptized, but directed his disciples to administer this rite to converts (Matt., xxviii, 19); and baptism, therefore, became a religious ceremony among Christians, taking rank as a sacrament with all sects which acknowledge sacraments. In the primitive church the person to be baptized was dipped in a river or in a vessel, with the words which Christ had ordered, generally adopting a new name more fully to express the change. Sprinkling, or, as it was termed, *clinic* baptism, was used only in the case of the sick who could not leave their beds. The Greek Church and Eastern schismatics retained the custom of immersion; but the Western Church adopted or allowed the mode of baptism by pouring or sprinkling, since continued by many Protestants. This practice can be traced back certainly to the third century, before which its existence is disputed. Since the Reformation there have been various Protestant sects called Baptists, holding that baptism should be administered only by immersion, and to those who can make a personal profession of faith. The Montanists in Africa baptized even the dead, and in Roman Catholic countries the practice of baptizing church-bells—a custom of tenth-century origin—continues to this day. Being an initiatory rite, baptism is only administered once to the same person. The Roman and Greek Catholics consecrate the water of baptism, but Protestants do not. The act of baptism is accompanied only with the formula that the person is baptized in the name of the Father, Son, and Holy Ghost; but, among most Christians, it is preceded by a confession of faith made by the person to be baptized if an adult, and by his parents or sponsors if he be a child. The Roman

Catholic form of baptism is far more elaborate than the Protestant. This church teaches that all adults not baptized are damned, even unbaptized infants are not admitted into heaven; but for those with whom the absence of baptism was the chief fault, even St. Augustine himself believed in a species of mitigated damnation. Protestants hold that though the neglect of the sacrament is a sin, yet the saving new birth may be found without the performance of the rite which symbolizes it. Naming the person baptized forms no essential part of the ceremony, but has become almost universal, probably from the ancient custom of renaming the catechumen.

Baptistery (bap-tis'tẽr-i), a building or a portion of a building in which is administered the rite of baptism. In the early Christian Church the baptistery was distinct from the basilica or church, but was situated near its west end, and was generally circular or octagonal in form, and dome-roofed. About the end of the sixth century the baptistery began to be absorbed into the church, the font being placed within and not far from the western door. Some detached baptisteries still remain in use, as those of St. John Lateran, Rome, at Pisa, Parma, Ravenna, Florence, etc., that of Florence being 108 feet in diameter externally, and richly decorated. Baptisteries were dedicated to St. John the Baptist.

Baptists (bap'tists), a Protestant denomination of Christians, so-called because of their distinctive views of baptism. Regarding the church as a completely spiritual institution, they maintain that membership, and therefore baptism, should be confined to believers only. Infants in the Baptist church are therefore not baptized. They further maintain that immersion is the correct mode of administering baptism. In the matter of communion Baptists hold differing views, some receiving Protestants of other denominations to the Lord's table, others refusing the privilege. Most of them hold the doctrine of Calvinism in a modified form; but the present tendency, especially in Great Britain is to recognize no other limitation to salvation than that which results from the exercise of man's free will. The form of church government is congregational. They maintain that each church is a spiritual democracy, possessed of the power of self-government under its exalted head, Jesus Christ, that the only officers of a New Testament church are pastors (otherwise called elders and bishops) and deacons, and that discipline should be exercised only with the consent of the members of the church. Although Baptist associations and conventions exist, they have no legislative or judicial function. The Baptist World Alliance was organized in 1905. Historically the modern Baptist movement dates from 1606 or 1607 when John Smyth with a small number of Separatists fled from England to Holland to escape persecution. In 1611 with Thomas Helwys and others Smyth formed the first English Baptist church. The next year Helwys returned with his followers to England and founded another church there. Other churches sprang up, and in 1633, the first Particular or Calvinistic Baptist church was organized. This and succeeding churches of the same sort joined in issuing a Confession of Faith, in which they set forth their Calvinistic doctrine of predestination and defined baptism as the 'dipping or plunging of the body in water.' The following century was one of dissension and slow growth, but in 1770 the New Connection of General Baptists was formed, and in 1792 the English Baptist Missionary Society. Finally in 1832 the General and Particular Baptists united for missionary and educational purposes in the Baptist Union, and in 1891 a complete union was effected. In America the first Baptist church was founded in Providence, Rhode Island, by Roger Williams in 1638. About 1644 a second church was established in Newport; in 1655 the First Baptist Church of Boston was organized; in 1683 or 1684 Baptist refugees from New England founded the first church in the South, near Charleston, South Carolina; by 1740 there were Baptist churches in all the colonies; and from that time the denomination increased rapidly. In 1812 the Baptist Education Society was organized; in 1814 the Foreign Missionary Society; in 1824 the Publication Society; and in 1832 the Home Mission Society. In 1845 the Southern Baptists withdrew from the general union for missionary purposes and formed the Southern Baptist Convention. In 1880 the negro Baptists withdrew and formed the National Baptist Convention. The German, Swedish and Dano-Norwegian Baptist churches also have separate conferences. There are besides the Regular Baptists in the United States other denominations holding essentially Baptist doctrines. They include the *Free Baptists*, formerly the Free Will Baptists, originating in New Hamphsire in 1780 as an anti-Calvinistic, 'open communion' body, but uniting in 1911 with the Regular Baptists for missionary and other interests; the *Free Will Baptists*, a small body in North and South Carolina, separated from the Regular Baptists in 1750 when the latter adopted Calvinistic doctrines; the *General Six-Principle Baptists*, a small body

represented in Massachusetts, Rhode Island and Pennsylvania, organized in 1670; the *Seventh Day Baptists*, observing Saturday as the Sabbath, were known in England as early as the 16th century and first represented in America in 1671; the *General Baptists*, differing but little from the Regular Baptists, but holding that the Atonement is general and not for the elect alone; the *Separate Baptists* allied in doctrine to the Free Baptists, the great majority of whom are now reunited with the Regular Baptists; the *United Baptists*, formed by the union of certain Separate and Regular Baptist churches, retaining the practice of foot-washing and 'close communion'; the *Baptist Church of Christ*, found only in the South, practicing foot-washing as an ordinance and claiming to be the oldest Baptist organization; the *Calvinistic Primitive Baptists*, also known as 'Old School,' 'Anti-Mission,' and 'Hard-Shell,' originating about 1833 in the South, practicing foot-washing and rejecting the institutions of Sunday school and missions as unscriptural; the *Old Two-Seed-in-the-Spirit Predestinarian Baptists*, holding to a strict Calvanism. In the U. S. and Canada there are 7,600,000; British Isles, 408,000; elsewhere, 1,000,000.

Baraboo (bār'a-bö), a city, county seat of Sauk Co., Wisconsin, 37 miles N. W. of Madison. It has factories, railroad shops, etc. It is 3 miles from Devil's Lake State Park and 15 miles from the Dells. Pop. 5538.

Baraguey-d'Hilliers (bà-rà-gā-dēl-yā), Louis, a distinguished French general under the first empire, born in Paris 1764. He served in the army of Italy, and in Egypt, Germany, and Spain; and in the Russian campaign of 1812 commanded a division. He was entrusted with the direction of the vanguard in the retreat, but was compelled to capitulate. Napoleon ordered him to return to France as under arrest, but he died at Berlin on the way, Jan. 6, 1813.

Barbadoes, or Barbados (bar-bā'dos), the most eastern of the West India Islands, first mentioned in 1518, and occupied by the British in 1625. Length 21 miles, breadth 13; area, 106,470 acres or 166 sq. miles; mostly under cultivation. It is divided into eleven Church of England parishes; capital, Bridgetown. It is more densely peopled than almost any spot in the world, the population now being about 200,000 or about 1200 to the square mile. The climate is pleasant, the heat being moderated by the trade-winds; but the island is subject to dreadful hurricanes. The surface is broken, now without forests, and with few streams; the highest point is 1104 feet above the sea-level. There is a thick surface deposit of coral rock and the island is evidently an uplifted coral reef. There are few indigenous mammals or birds. The black lowland soil gives great returns of sugar in favorable seasons. The chief exports, besides sugar, are molasses and rum; imports: rice, salt meat, corn, butter, flour, etc. Barbadoes has a considerable transit trade, being in some measure the central mart for all the Windward Islands. It is the see of a bishop and the headquarters of the British Agricultural Department. There is a railway across the island, also street-cars, telephones, etc. The island forms a distinct government under a governor, an executive and a legislative council, and a house of assembly. Liberal provision is made for education both by old foundations and by annual vote.

Barbadoes Cherry, the pleasant tart, fleshy fruit of *Malpighia punicifolia*, a West Indian tree 15 ft. high.

Barbadoes Gooseberry, the fruit of *Pereskia Pereskia*, a West Indian species of cactus.

Barbadoes Leg, a form of elephantiasis chiefly affecting the legs.

Barbara (bar'ba-ra), St., according to the legend, belonged to Nicomedia, in Asia Minor, and was beheaded by her father for having become a Christian, he being immediately thereafter struck dead by lightning. She is invoked in storms, and is considered the patron saint of artillerists.

Barbarelli (bar-ba-rel'i). See *Giorgione.*

Barbarian (bar-bā'ri-an; Greek, *barbaros*), a name given by the Greeks, and afterwards by the Romans, to every one who spoke an unintelligible language; and hence coming to connote the idea of *rude, illiterate, uncivilized.* This word, therefore, did not always convey the idea of something odious or savage; thus Plautus calls Nævius a barbarous poet, because he had not written in Greek; and Cicero terms illiterate persons without taste 'barbarians.'

Barbarossa (bar-ba-ros'a; Italian, 'red-beard'), a surname given to Frederick I of Germany.

Barbarossa ('red-beard'), the name of two famous Turkish corsairs of the sixteenth century, who ravaged the shores of the Mediterranean and established themselves in Algiers. The elder of the brothers, Aruch or

Horuk, was killed in 1518; the younger and more notorious, Khair-ed-Din, who captured Tunis, died in 1546.

Barbaroux (bär-bä-rö), CHARLES JEAN MARIE, noted French revolutionist, born 1767. Notable among other things as having instigated the march of the battalion of Marseillais to Paris. Voted for the death of Louis XVI. Was guillotined at Bordeaux in 1794.

Barbary (bar'ba-ri), a general name for the most northerly portion of Africa, extending about 2600 miles from Egypt to the Atlantic, with a breadth varying from about 140 to 550 miles; comprising Morocco, Algeria, Tunis, and Tripoli (including Barca and Fezzan). The principal races are: the Berbers, the original inhabitants, from whom the country takes its name; the Arabs, who conquered an extensive portion of it during the times of the Caliphs; the Bedouins, Jews, Turks, and the French colonists of Algeria, etc. The country, which was prosperous under the Carthaginians, was, next to Egypt, the richest of the Roman provinces, and the Italian states enriched themselves by their intercourse with it. During the 16th century, however, it became infested with adventurers who made the name of Barbary corsair a terror to commerce, a condition of things finally removed by the resistance of the American fleets and the French occupation of Algeria.

Barbary Ape (*Inŭus ecaudātus*), a species of ape, or tailless monkey, with yellowish-brown hair, of the size of a large cat, remarkable for docility; also called the *magot*. It is common in Barbary and other parts of Africa, and has been carefully protected on Gibraltar Rock, being the only European monkey, though probably not indigenous. It has been the 'showman's ape' from time immemorial.

Barbastro (bar-bas'trō), a city of Aragon, Spain, province of Huesca, 50 miles N. E. of Saragossa, with an interesting cathedral, and some trade and manufactures. Pop. 7033.

Barbauld (Fr. pron. bar-bō'), ANNA LETITIA, an English poet and general writer, was born in Leicestershire 1743, daughter of a Presbyterian minister named Aikin. In 1774 she married the Rev. Rochemont Barbauld. Her *Early Lessons and Hymns for Children*, and various essays and poems, won considerable popularity. She edited a collection of English novels, with critical and biographical notices, and some other works. Her last long poem, *Eighteen Hundred and Eleven*, appeared in 1812. She died at Stoke-Newington, 1825.

Barbel (bär'bel), a genus (*Barbus*) of fresh-water fishes of the carp family, distinguished by the four fleshy filaments growing from the lips, two at the nose and one at each corner of the mouth, forming the kind of beard to which the genus owes its name. Of the several species the European *Barbus vulgāris*, common in most rivers, has an

Barbel (*Barbus vulgāris*).

average length of from 12 to 18 inches, and in form and habits strongly resembles the pike. Its body is elongated and rounded, olive-colored above and bluish on the sides, and covered with small scales. The upper jaw, which is much longer than the lower, forms a snout, with which it bores into the mud for worms, insects, aquatic plants, etc. It weighs from 9 to 20 pounds. It gives good sport to the angler, but its flesh is very coarse, and at the time of spawning the roe is dangerous to eat.

Barber, one whose occupation is to shave or trim the beard and to cut and dress hair. The practice of surgery was formerly a part of the craft, and by an act of Henry VIII, the Company of Barbers was incorporated with the Company of Surgeons—the company being then known as the Barber-surgeons —with the limitation, however, that the surgeons were not to shave or practise 'barbery,' and the barbers were to perform no higher surgical operation than blood-letting and tooth-drawing. This continued till the time of George II. The signs of the old profession—the pole which the patient grasped, its spiral decoration in imitation of the bandage, and the basin to catch the blood—are still sometimes retained. The barbers' shops, always notorious for gossip, were in some measure the news-centers of classic and mediæval times.

Barberini (bär-be-rē'nē), a celebrated Florentine family, which, since the pontificate of Maffeo Barberini (Urban VIII, 1623 to 1644), has occupied a distinguished place among the nobility of Rome. During his reign he seemed chiefly intent on the aggrandizement of his three nephews, of whom two

were appointed cardinals, and the third Prince of Palestrina.

Barberry (bår'bėr-i), a genus of shrubs, order Berberidaceæ, the common barberry (*Berbĕris vulgāris*) having bunches of small beautiful red berries, somewhat oval; serrated and pointed leaves; thorns, three together, upon the branches; and hanging clusters of yellow flowers. The berries nearly approach the tamarind in respect of acidity, and when boiled with sugar make an agreeable preserve, rob, or jelly. They are also used as a dry sweetmeat, and in sugar-plums or comfits; are pickled with vinegar, and are used for the garnishing of dishes. The bark is said to have medicinal properties; the roots yield a yellow dye, used in working morocco leather. The shrub was originally a native of eastern countries, but it is now generally diffused in Europe, as also in North America. In England it has been almost universally banished from hedgerows, from the belief that it causes rust on wheat—a supposition supported by the fact that it is subject itself to attacks of a sort of epiphyte. Numerous other species belong to Asia and America.

Barberton (bar'ber-tun), a city of Summit Co., Ohio, 7 miles s. of Akron. It was originally called New Portage. Among the industries are lumber, matches, boilers, etc. Pop. 18,811.

Barberton, a town of the Transvaal, Union of S. Africa, center of De Kaap gold fields. Pop. 2433.

Barbet (bar'bet), a family (*buccónidæ*) of climbing birds with a thick, conical beak, having tufts of bristles at its base. Their wings are short and their flight somewhat heavy. They have been divided into three subgenera:—The *barbicans* (*Pogonias*), inhabiting India and Africa, and feeding chiefly on fruit; the *barbets* proper (*Bucco*), found in Africa and America, and nearly related to the woodpeckers; and the *puff-birds* (*Tamatia*), inhabiting America and feeding on insects. The name is given also to a kind of poodle dog.

Barbette (bår-bet'), an elevation of earth behind the breastwork of a fortification, from which the artillery may be fired over the parapet instead of through an embrasure. A barbette carriage is a carriage which elevates a gun sufficiently high to permit its being fired over the parapet.

Barbeyrac (bår-bā-råk), Jean, an able French writer on jurisprudence and natural law, translator of Grotius and Cumberland, and translator and annotator of Pufendorf. Born 1674; professor of law at Lausanne and Groningen; died 1744.

Barbié du Bocage (bårb-yā dü bō-käzh), Jean Denis, a distinguished geographer, born in Paris in 1760, who laid the foundation of his fame in 1788 by his Atlas to Barthélemy's *Voyage du Jeune Anacharsis*. His maps and plans to the works of Thucydides, Xenophon, etc., exhibit much erudition, and materially advanced the science of ancient geography. He also prepared many modern maps, and published various excellent dissertations. He held many honorable posts, and died in 1825.

Barbieri (bår-bē-ā'rē), Giovanni Francesco, otherwise known as *Guercino* (the squinter) *da Cento*, an eminent and prolific historical painter, born near Bologna 1590; died in 1666. His style showed the influence of Caravaggio and of the Caracci, his best work being of the latter school. Chief work, a St. Petronilla in the Capitol at Rome; but most of the large galleries have pictures by him.—Paolo Antonio Barbieri, a celebrated still-life and animal painter, was a brother of Guercino; born 1596; died 1640.

Barbison (bär-bi-sōn'), a hamlet and favorite residence of artists, dep. Seine-et-Marne, France, on the outskirts of the forest of Fontainebleau. It owes its fame to the illustrious Barbison School (1840–75), a group of artists including Corot, Millet, Rousseau, Troyon and Daubigny, whose work showed a reaction against all false romanticism.

Barbiton (bär'bi-ton), a stringed instrument of frequent mention in Greek and Roman classical literature. It partook of some of the features of the lyre, both in its construction and in the manner in which it was played. An instrument also called barbition was known in Europe during the 16th and 17th centuries. It was a sort of bass-lute, called *theorbo*, but identified in 18th century dictionaries with the barbition of classic Greece and Rome.

Barbour (bar'bur), John, an ancient Scottish poet, contemporary with Chaucer, born about 1316. His chief poem, *The Bruce*, written about 1375, was first published in 1571, and a MS. exists in the Advocates' Library, Edinburgh, dated 1489. Of another long poem, setting forth the Trojan origin of the Scottish kings, no MS. remains, unless a portion of two Troy books in the Cambridge and Bodleian libraries may be ascribed to Barbour. He has also been credited, probably without sufficient grounds, with having compiled a *Book of Legends of Saints*, existing in a single

MS. at Cambridge, and published only in recent times. He died in 1395. He was the father of Scottish poetry and history, and his Bruce is linguistically of high value. Though wanting in the higher qualities of poetry, it is truthful and natural, and often exhibits a high moral dignity.

Barbuda (bår-bŏ′da), one of the West Indies, annexed by Britain in 1628; about 15 miles long and 8 wide; lying north of Antigua; pop. 775. It is flat, fertile, and healthy. Corn, cotton, pepper, and tobacco are the principal produce, but the island is only partially cleared for cultivation. There is no harbor, but a well-sheltered roadstead on the W. side. It is a dependency of Antigua, and its population consists mostly of negroes chiefly engaged in cattle raising.

Barby (bår′bē), a German town on the Elbe, in the government of Magdeburg, with an old castle. Pop. 5137.

Barca (bar′ka), a division of N. Africa, between the Gulf of Sidra and Egypt, formerly under Turkish, now under Italian dominion. It formed a portion of the ancient Cyrenaica, and from the time of the Ptolemies was known as Pentapolis from its five Greek cities. The country forms mostly a rocky plateau. A large portion of it is desert, but some parts, especially near the coast, are fertile, and yield abundant crops and excellent pasture, the chief being wheat, barley, dates, figs, and olives. Flowering shrubs, roses, honeysuckles, etc., occur in great variety. There are hardly any permanent streams, but the eastern portion is tolerably well watered by rains and springs. The exports are grain and cattle, with ostrich feathers and ivory from the interior. Next to Bengazi, the capital, the seaport of Derna is the chief town. The pop. probably does not exceed 300,000.

Barcarolle (bår′ka-rōl), a species of song sung by the *barcaruoli*, or gondoliers of Venice, and hence applied to a song or melody composed in imitation.

Barcellona (bår-chel-ō′nå), a seaport of Sicily, province of Messina, immediately contiguous upon Pozzo di Gotto, and practically forming one town with it. Joint pop. 23,493.

Barcelona (bår-thel-ō′nå), one of the largest cities of Spain, chief town of the province of Barcelona, and formerly capital of the kingdom of Catalonia; finely situated on the northern portion of the Spanish Mediterranean coast. It is divided into the upper and lower town; the former modern, regular, stone-built, and often of an English architectural type, the latter old, irregular, brick-built, and with traces of Eastern influence in the architecture. There is an inner harbor of 18 to 30 ft. depth; an outer harbor of 20 to 35 ft. The principal manufactures are cottons, silks, woolens, machinery, paper, glass, chemicals, stoneware, soap; exports manufactured goods, wine and brandy, fruit, oil, etc.; imports coal, textile fabrics, machinery, cotton, fish, hides, silks, timber, etc. The city contains a university, several public libraries, a museum, a cathedral, and many theatres, etc. Barcelona was until the 12th century, governed by its own counts, but was afterwards united with Aragon. In 1640, with the rest of Catalonia, it placed itself under the French crown; in 1652 it submitted again to the Spanish government; in 1697 it was taken by the French, but was restored to Spain at the Peace of Ryswick. It has had several severe visitations of cholera and yellow fever, and has been the scene of many serious and sanguinary revolts as in 1836, 1840, and 1841. Population, 560,000. The province has an area of 2968 sq. mi.; pop. 1,054,541. It is generally mountainous, but well cultivated, and among the most thickly peopled in Spain.

Barcelona, a town of Venezuela, near the mouth of the Neveri, which is navigable for vessels of small size, but larger vessels anchor off the mouth of the river. Coal and salt are mined in the vicinity. Pop. about 10,000.

Barcelona Nuts, hazel-nuts exported from the Barcelona district of Spain.

Bar′clay, ALEXANDER, a poet of the sixteenth century, most probably a native of Scotland, born about 1475, for some years a priest and chaplain of St. Mary Ottery, in Devonshire, afterwards a Benedictine monk of Ely, subsequently a Franciscan, and latterly the holder of one or two livings; died 1552. His principal work was a satire, entitled *The Shyp of Folys of this Worlde*, part translation and part imitation of Brandt's *Narrenschiff* ('Ship of Fools'), and printed by Pynson in 1509. He also wrote a *Myrrour of Good Maners*, and some *Egloges* (Eclogues), both printed by Pynson, as well as translations, etc.

Barclay, JOHN, poet and satirist, son of a Scotch father, born at Pont-à-Mousson (Lorraine), in 1582, and probably educated in the Jesuits' College there. Having settled in England he published a Latin politico-satirical romance, entitled *Euphormionis Satyricon*, having as its object the exposure of the Jesuits. In 1616 he left England for

Rome, for some unexplained reason, and died there in 1621. His chief work is a singular romance in Latin, entitled *Argenis* (Paris, 1621), thought by some to be an allegory bearing on the political state of Europe at the period. It has been translated into several modern languages.

Barclay, ROBERT, the celebrated apologist of the Quakers, born in 1648, at Gordonstown, Moray, and educated at Paris, where he leaned to Roman Catholicism. Recalled home by his father, he followed the example of the latter and became a Quaker. His first treatise in support of his adopted principles, published at Aberdeen in the year 1670, under the title of *Truth Cleared of Calumnies*, together with his subsequent writings, did much to rectify public sentiment in regard to the Quakers. His chief work, in Latin, *An Apology for the True Christian Divinity, as the same is Preached and held forth by the People called, in scorn, Quakers*, was soon reprinted at Amsterdam, and quickly translated into German, Dutch, French, and Spanish, and, by the author himself, into English. His fame was now widely diffused; and, in his travels with William Penn and George Fox through England, Holland, and Germany, to spread the opinions of the Quakers, he was received everywhere with the highest respect. The last of his productions, *On the Possibility and Necessity of an Inward and Immediate Revelation*, was not published in England until 1686; from which time Barclay lived quietly with his family. He died, after a short illness, at his own house of Ury, Kincardineshire, in 1690. He was a friend of and had influence with James II.

Barclay de Tolly, MICHAEL, PRINCE, a distinguished general and field-marshal of Russia, born in 1761. His family, of Scottish origin, had been established in Livonia since 1689. He entered the army at an early age, served with distinction in various campaigns against the Turks, Swedes, and Poles, and in 1811 was named minister of war. On the invasion of Napoleon he was transferred to the chief command of the army, and adopted a plan of retreat; his forces did not greatly exceed 100,000 men, but the court became impatient, and after the capture of Smolensk by the French he was superseded by Kutusoff. Sinking all personal feeling, he asked leave to serve under his successor, commanded the right wing at the battle of the Moskwa, maintained his position, and covered the retreat of the rest of the army. After the battle of Bautzen, in 1813, he was reappointed to the chief command, which he had soon after to resign to Prince Schwarzenberg. He forced the surrender of General Vandamme after the battle of Dresden, took part in the decisive battle of Leipzig, and was made a field-marshal in Paris. In 1815 he received from the emperor the title of prince, and from Louis XVIII the badge of the order of Military Merit. He died in 1818.

Bar-cochba (bår-ko*h*'bå), SIMON, a Jewish impostor, who pretended to be the Messiah, raised a revolt, and made himself master of Jerusalem about 132 A.D., and of about fifty fortified places. Hadrian sent to Britain for Julius Severus, one of his ablest generals, who gradually regained the different forts and then took and destroyed Jerusalem. Bar-cochba retired to a mountain fortress, and perished in the assault of it by the Romans three years after, about 135.

Bar'coo. See *Cooper's Creek.*

Bard, one of an order among the ancient Celtic tribes, whose occupation was to compose and sing verses in honor of the heroic achievements of princes and brave men, generally to the accompaniment of the harp. Their verses also frequently embodied religious or ethical precepts, genealogies, laws, etc. Their existence and function was known to the Romans two centuries B. C.; but of the Gallic bards only the tradition of their popularity survives. The first Welsh bards of whom anything is extant are Taliesin, Aneurin, and Llywarch, of the sixth century. A considerable lacuna then occurs in their history until the order was reconstituted in the tenth century by King Howel Dha, and again in the eleventh by Gryffith ap Conan. Edward I is said to have hanged all the Welsh bards as promoters of sedition. Some attempts have been made in Wales for the revival of bardism, and the Cambrian Society was formed in 1818 for this purpose and for the preservation of the remains of the ancient literature. The revived Eisteddfodan, or bardic festivals, have been so far exceedingly popular. In Ireland there were three classes of bards: those who sang of war, religion, etc., those who chanted the laws, and those who gave genealogies and family histories in verse. They were famous harpists. In the Highlands of Scotland there are considerable remains of compositions supposed to be those of their old bards.

Bardesanes (bar-de'sā-nēs), a Syrian Gnostic, who lived in the

reign of Caracalla, in Edessa, and whose system of faith bore a close resemblance to the earlier Gnostic teachings of Valentinus. He spread his doctrine by the means of hymns in the Syrian language, and they appear to have been received with favor in the orthodox Church as late as the end of the 5th century, when they were superseded by the work of Ephraem the Syrian. Of his numerous writings only a dialogue on fate survives.

Bardwan, or BURDWAN', a division of Bengal, upon the Hugli, comprising the six districts of Bardwan, Hugli, Howrah, Midnapur, Bankura, and Birbhum. Area, 13,855 sq. miles; pop. 8,245,000.—The district Bardwan has an area of 2697 sq. miles, and a pop. of 1,500,000. Apart from its products, rice, grain, hemp, cotton, indigo, etc., it has a noted coal-field of about 500 sq. miles in area, with an annual output of about three million tons.—The town of Bardwan has a fine palace of the maharajah and an extensive group of temples. Pop. about 35,000.

Barebone, or BARBON, PRAISE-GOD, the name of a leather seller in Fleet Street, London, who obtained a kind of lead in the convention which Cromwell substituted for the Long Parliament, and which was thence nicknamed the Barebone Parliament. After its dissolution he disappears till 1660, when he presented a petition to Parliament against the restoration of the monarchy. In 1661 he was committed to the Tower for some time, but his subsequent history is unknown. Died 1679.

Barefooted Friars, monks who used sandals, or went barefoot. They were not a distinct body, but may be found in several orders of mendicant friars—for example, among the Carmelites, Franciscans, Augustins. There were also barefooted nuns.

Barège (ba-rāzh'), a light, open tissue of silk and worsted or cotton and worsted for women's dresses, originally manufactured near Barèges.

Barèges (bå-razh), a watering-place, s. of France, dep. Hautes-Pyrénées, about 4000 feet above the sea, celebrated for its thermal springs, which are frequented for rheumatism, scrofula, etc. The place is hardly inhabited except in the bathing season, June till September.

Baregine (ba-rāzh'in; from *Barèges*), a gelatinous product of certain algæ growing in sulphuric mineral springs, and imparting to them the color and odor of flesh-broth.

Bareilly (ba-rā'li), a town of Hindustan in the N. W. Provinces, capital of a district of same name, on a pleasant and elevated site. It has a fort and cantonments, a government college, and manufactures sword-cutlery, gold and silver lace, perfumery, furniture and upholstery. On the outbreak of the Indian mutiny the native garrison took possession of the place, but it was retaken by Lord Clyde in May, 1858. Pop. 131,208. The district has an area of 1595 sq. miles; pop. 1,040,000.

Barents (bär'ents), WILLEM, a Dutch navigator of the end of the 16th century, who, on an expedition intended to reach China by the northeast passage, discovered Nova Zembla. He wintered there in 1596-97, and died before reaching home.

Baretti (bä-ret'tē), GIUSEPPE, an Italian writer, born at Turin, 1719. In 1748 he came to England, and in 1753 published in English a *Defence of the Poetry of Italy against the Censures of M. Voltaire.* In 1760 he brought out a useful *Italian and English Dictionary.* After an absence of six years, during part of which he edited the *Frusta Letteraria* ('Literary Scourge') at Venice, he returned to England, and in 1768 published an *Account of the Manners and Customs of Italy.* Not long after, in defending himself in a street brawl, he stabbed his assailant and was tried for murder at the Old Bailey, but acquitted; Johnson, Burke, Goldsmith, Garrick, Reynolds, and Beauclerk giving testimony to his good character. An *English and Spanish Dictionary* and various other works, followed before his death in 1789.

Barfleur (bär-fleur), at one time the best port on the coast of Normandy, and the reputed port from which William the Conqueror sailed to England. In 1120 the 'White Ship' sank outside the harbor, with Prince William, only son of Henry I, on board. Present pop. about 1000.

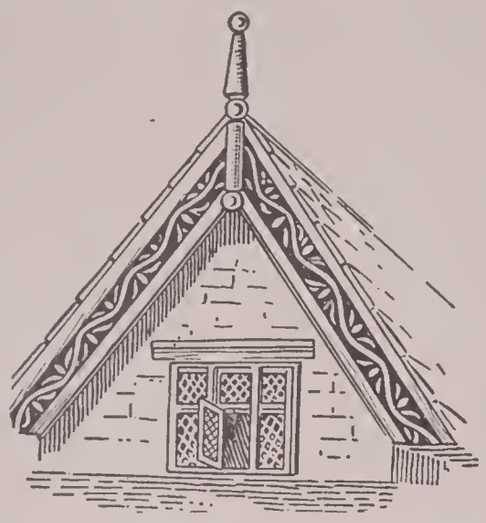
Barfrush, BARFURUSH'. Same as *Balfroosh.*

Bargain and Sale, a legal term denoting the contract by which lands, tenements, etc., are transferred from one person to another.

Barge (bårj), a term similar in origin to *barque*, but generally used of a flat-bottomed boat of some kind, whether used for loading and unloading vessels, or as a canal-boat, or as an ornamental boat of state or pleasure.

Barge-board (perhaps a corruption of *verge-board*), in architecture, a board generally pendent from the eaves of gables, so as to conceal the rafters, keep out rain, etc. They are

sometimes elaborately ornamented. The portion of the roof projecting from the



Barge-board of the Fifteenth Century

wall at the gable-end, and beneath which the barge-board runs, is termed the *barge-course*.

Barham (bar'am), RICHARD HARRIS, a humorous writer, born in 1788 at Canterbury; educated at Paul's School, London, and at Brasenose, Oxford. He was ordained in 1813, and after a succession of various ecclesiastical appointments, he became in 1821 one of the minor canons of St. Paul's Cathedral. He published an unsuccessful novel, *Baldwin*, wrote nearly a third of the articles in *Gorton's Biographical Dictionary*, and contributed to *Blackwood's Magazine*. In 1824 he was appointed priest in ordinary of the chapel-royal. Undeterred by the failure of his first novel, he published a second in 1834. In 1837, on the starting of *Bentley's Miscellany*, he laid the main foundation of his literary fame by the publication in that periodical of the *Ingoldsby Legends*. He died in 1845.

Bar Harbor, a village and popular summer resort of Mt. Desert Island, Maine, 46 miles S. E. of Bangor. It has annually 15,000 to 20,000 summer visitors, and ranks with Newport as an exclusive fashionable resort.

Barhebræus. See *Abulfaragius*.

Bari (bä'rē; anc. *Barium*), a seaport of S. Italy, on a small promontory of the Adriatic, capital of the province of the same name. It was a place of some importance as early as the 3d century B.C., and has been thrice destroyed and rebuilt. The present town, though poorly built for the most part, has a fine cathedral begun in 1035, medieval churches, etc. It manufactures cotton and linen goods, hats, soap, glass, and liquors; has a trade in wine, grain, almonds, oil, etc., and is now an important seaport. Pop. about 103,670. The modern province of Bari has an area of 2066 sq. miles, and is fertile in fruit, wine, oil, etc.; pop. 837,683.

Bari, a negro people of Africa, dwelling on both sides of the White Nile, and having Gondokoro as their chief town. They practise agriculture and cattle-rearing. Their country was conquered by Sir Samuel W. Baker for Egypt.

Barilla (ba-ril'la), the commercial name for the impure carbonate and sulphate of soda imported from Spain and the Levant. It is the Spanish name of a plant (*Salsŏla sativa*), from the ashes of which and from those of others of the same genus the crude alkali is obtained. On the shores of the Mediterranean the seeds of the plants from which it is obtained are regularly sown near the sea, and these, when at a sufficient state of maturity, are pulled up, dried, and burned in bundles in ovens or in trenches. It is now used principally in the manufacture of soap and glass. Soda is now obtained for the most part from common salt.

Baring-Gould (bā-ring-gōōld'), SABINE, English clergyman and author, born at Exeter 1834. He was educated at Cambridge, held several livings in the English Church, wrote with considerable success on theological and miscellaneous subjects, and more recently distinguished himself as a novelist. Among his works are: *Iceland, Its Scenes and Sagas; Curious Myths of the Middle Ages; The Origin and Development of Religious Belief; Lives of the Saints* (in 15 vols.); besides the novels *Mehalah, John Herring, Richard Cable, The Gaverocks*, etc.; and short stories or novelettes; and a number of hymns, among them *Onward, Christian Soldiers*.

Baringo, a lake in Africa, N. E. of the Victoria Nyanza, about 20 miles long.

Barisal (bur-ē-säl'), a town of British India, in Backergunje district, Eastern Bengal and Assam, on a river of the same name. It is an important trade center. Pop. 18,978.

Barite (ba'rīt), a mineral with the formula $BaSO_4$, occurring massive, and in granular, earthy and stalactite forms. Sp. gravity ranges from 4.3 to 4.6, hence sometimes called 'heavy-spar.' It occurs in large quantities in many parts of the world. It forms an important source of barium compounds.

Baritone, or BARYTONE (bâr'i-tōn), a male voice, the compass of which partakes of those of the common bass and the tenor, but does not extend so far downwards as the one nor to or

equal height with the other. Its best tones are from the lower A of the bass clef to the lower F in the treble. Formerly applied to lower, or heavy, bass voice: bary, *i. e.* heavy, tone.

Barium (bā′ri-um), a metallic element of yellow color, symbol Ba, specific gravity 4. It is found only in compounds, such as the common sulphate and carbonate, and was isolated by Davy for the first time in 1808. It is malleable and fuses at a low temperature. It decomposes water at low temperatures, and when exposed to the air quickly combines with oxygen, which it is used to isolate; also used to precipitate sulphates from solutions.

Bark, the exterior covering of the stems of exogenous plants. It is composed of cellular and vascular tissue, is separable from the wood, and is often regarded as consisting of four layers: 1st, the *epidermis* or *cuticle*, which, however, is scarcely regarded as a part of the true bark; 2d, the *epiphlœum* or outer cellular layer of the true bark or cortex; 3d, the *mesophlœum* or middle layer, also cellular; 4th, an inner vascular layer, the *liber* or *endophlœum*, commonly called *bast*. Endogenous plants have no true bark. Bark contains many valuable products, as gum, tannin, etc.; cork is a highly useful substance obtained from the epiphlœum; and the strength and flexibility of bast makes it of considerable value. Bark used for tanning is obtained from oak, hemlock-spruce, a species of acacia growing in Australia, etc. Angostura bark, Peruvian or cinchona bark, cinnamon, cascarilla, etc., are useful barks.

Bark. See *Barque.*

Bark, PERUVIAN, is a bark of various species of trees of the genus *Cinchona*, found in many parts of South America, but more particularly in Peru, and having medicinal properties. It was formerly called *Jesuit's bark*, from its having been introduced into Europe by Jesuits. Its medicinal properties depend upon the presence of the alkaloid *quinine*, which is now extracted from the bark, imported, and prescribed in place of nauseous mouthfuls of bark. See *Cinchona.*

Barker's Mill, also called Scottish turbine, a hydraulic machine on the principle of what is known as the hydraulic tourniquet. This consists of an upright vessel free to rotate about a vertical axis, and having at its lower end two discharging pipes projecting horizontally on either side and bent in opposite directions at the ends, through which the water is discharged horizontally, the direction of discharge being mainly at right angles to a line joining the discharging orifice to the axis. The backward pressures at the bends of the tubes, arising from the two issuing jets of water, cause the apparatus to revolve in an opposite direction to the issuing fluid.

Barking, a town of England, county of Essex, on the Roding, 7 miles N. E. of London, with some important manufacturing works. Near it is the outfall of the sewage of a large part of London. Pop. (1911) 31,302.

Bark-stove, BARK-BED, a sort of hot-house for forcing or for growing plants that require a great heat combined with moisture, both of which are supplied by the fermentation that sets up in a bed of spent tanner's bark contained in a brick pit under glass.

Bar'laam and Jos'aphat, a famous mediæval spiritual romance, which is in its main details a Christianized version of the Hindu legends of Buddha. The story first appeared in Greek in the works of Joannes Damascenus in the eighth century. The compilers of the *Gesta Romanorum*, Boccaccio, Gower, and Shakespere have all drawn materials from it.

Bar-le-duc (bår-l-dûk), a town of Northeast France, on the river Ornain, capital of the department of Meuse, with manufactures of cotton and woolen stuffs, leather, confectionery, etc. Pop. (1906) 14,624.

Barletta (bar-let'tå), a seaport in South Italy, province of Bari, on the Adriatic, with a fine Gothic church; it has a considerable export trade in grain, wine, almonds, etc. Pop. 40,388.

Barley (bår'li), the name of several cereal plants of the genus *Hordeum*, order Gramineæ (grasses), yielding a grain used as food and also for making malt, from which are prepared beer, porter, and whisky. Barley has been known and cultivated from remote antiquity, and beer was made from it among the Egyptians. The cultivation of it extends from Italy northward in Europe, it being used for making bread in the north, being better adapted than any other grain to the most northerly grain-growing latitude. The species principally cultivated are *Hordĕum distĭchum*, two-rowed barley: *H. vulgāre*, four-rowed barley; and *H. hexastichum*, six-rowed, of which the small variety is the sacred barley of the ancients. The varieties of the four and six-rowed

species are generally coarser than those of the two-rowed, and adapted for a poorer soil and more exposed situation. Some of these are called *bere* or *bigg*. In Britain barley occupies about the same area as wheat, but in N. America the extent of it as a crop is comparatively small, being in Canada, however, relatively greater than in the States, and the Canadian barley is of very high quality. Barley is better adapted for cold climates than any other grain, and some of the coarser varieties are cultivated where no other cereal can be grown. *Pot* or *Scotch barley* is the grain deprived of the husk in a mill. *Pearl barley* is the grain polished and rounded and deprived of husk and pellicle. *Patent barley* is the farina obtained by grinding pearl barley. *Barley water*, a decoction of pearl barley, is used in medicine as possessing emollient, diluent, and expectorant qualities.

Barley-sugar, pure sugar melted and allowed to solidify into an amorphous mass without crystallizing.

Barlow (bär'lō), Joel, an American poet and diplomatist; born in Connecticut in 1754. After an active and changeful life as chaplain in the Revolutionary war, lawyer, editor, land-agent, lecturer, and consul, he went to Paris and acquired a fortune. On his return to America he was appointed minister plenipotentiary to France (1811), but died near Cracow in 1812 on his way to meet Napoleon. His principal poem, the *Columbiad*, dealing with American history from the time of Columbus, was published in 1807. It is a weighty epic which no one now reads.

Barm. See *Yeast*.

Barmecides (bär'me-sīdz), a distinguished Persian family, whose virtue and splendor form a favorite subject with Mohammedan poets and historians. Two eminent members of this family were Khaled-ben-Barmek, tutor of Harun al Rashid; and his son Yahya, grand vizier of Harun. The expression *Barmecides Feast*, meaning a visionary banquet or make-believe entertainment, originates from the Barber's story of his Sixth Brother in the *Arabian Nights' Entertainments*.

Barmen (bär'men), a German city on the Wupper, in the Prussian Rhine Province, government of Düsseldorf, and forming a continuation of the town of Elberfeld, in the valley of Barmen. It has extensive ribbon and other textile manufactures. A monorail system of transit is in successful operation between Elberfeld and Barmen. Pop. (1919) 156,326.

Barnabas (bär'na-bas), the surname given by the apostles to Joses, a fellow-laborer of Paul, and, like him, ranked as an apostle. According to tradition he became the first bishop of Milan, but he is not mentioned in Ambrose's list; it is thought that he suffered martyrdom at Cyprus. His festival is held on the 11th June.

Barnabas, Saint, Epistle of, an epistle in twenty-one chapters unanimously ascribed to Barnabas by early Christian writers, but without any support of internal evidence. It was probably written between 119 and 126 B.C., by one who was not a Jew and under the influence of Alexandrian Judaistic thought.

Barnabites (bär'na-bīts), an order of canons founded in Milan in 1530 and named after the Milan church of St. Barnabas, which was allotted them to preach in. A few houses of the congregation still exist in Belgium and Italy.

Barnacle (bär'na-kl), the name of a family (*Lepadidæ*) of marine crustaceous animals, order *Cirripedia*. They are enveloped by a mantle and shell, composed of five principal valves and several smaller pieces, joined together by a membrane attached to their circumference; and they are furnished with a long, flexible, fleshy stalk or peduncle, provided with muscles, by which they attach themselves to ships' bottoms, submerged timber, etc. They feed on small marine animals brought within their reach by the water and secured by their tentacula. Some of the larger species are edible. According to an old fable, these animals produced barnacle geese.

Barnacle (*Lepas anatifera*).

Barnacle Goose (*Anser bernicla* or *leucopsis*), a summer visitant of the northern seas, in size rather smaller than the common wild goose, and having the forehead and cheeks white, the upper body and neck black. This bird became the subject of a curious popular fable, not yet extinct, being believed to be bred from the fruit of a tree growing on the seashore, or from a shellfish which grew on the tree, or from rotting wood in the water.

Barnard-Castle, a town of England, County Durham. There are a large threadmill and carpet

THE LIFE OF HUMANITY

Two groups by George Gray Barnard at the entrance to the Pennsylvania State Capitol at Harrisburg.

manufactories. It has the ruins of a stately castle originally built in 1178 by Bernard Baliol, grandfather of John Baliol, and a valuable fine-art museum. Pop. 4757.

Barnard College, a non-sectarian institution for the education of women in New York City. It is included in the educational system of Columbia University (*q. v.*). All Barnard degrees are granted by and in the name of Columbia University, whose president is ex-officio president of Barnard. The endowment of the college is about $1,500,000, and the value of the buildings and grounds nearly $4,000,000. Miss Virginia Crocheron Gildersleeve was appointed dean in 1911. The enrolment of students in 1916 was 760.

Barnard, Edward Emerson, astronomer, born at Nashville, Tennessee, in 1857; graduated at Vanderbilt University 1887; was astronomer at the Lick Observatory 1887-95; afterwards at the Yerkes observatory and professor of Astronomy at the University of Chicago. He discovered in 1892 a fifth satellite of Jupiter, made other discoveries of importance, and did valuable work in celestial photography. He has been awarded the gold medals of various French and British societies.

Barnard, Frederick Augustus, teacher and educational writer, born at Sheffield, Mass., in 1809. He graduated at Yale in 1828, was professor in the University of Alabama 1837-54, took orders in the P. E. Church in 1854, was president of the University of Mississippi 1856-61, and 1864-88 president of Columbia College, New York, which he endowed with Barnard College. He wrote *Recent Progress of Science, The Metric System, Letters on College Government*, etc. He died April 27, 1889.

Barnard, George Grey, sculptor, born at Bellefonte, Pennsylvania, May 24, 1833, educated at Art Institute, Chicago, and at Ecole Nationale des Beaux Arts, Paris; was awarded gold medals at the Paris Exposition of 1900 and the Buffalo Exposition of 1901. His productions include *Brotherly Love, Two Natures, The God Pan* (in Central Park, N. Y.), *Mother and Angel, Urn of Life, The Life of Humanity* (made for the Pennsylvania State Capitol), and the world-famous *Lincoln*, unveiled in Lytte Park, Cincinnati, in 1917. A replica of the latter was selected by the American Committee for the Celebration of the Century of Peace between Great Britain and America as its gift to England. The statue emphasizes the homely characteristics of Lincoln and aroused much controversy.

Barnardo, Thomas John, a philanthropist, born in Ireland in 1845, died 1905. In 1866, while studying in London Hospital, he became interested in the condition of homeless children, founded a 'Home' for them in 1867, and afterwards organized institutions in which 60,000 orphan waifs were rescued and trained for useful careers. He founded the Young Helpers' League in 1891 and wrote much on the reclamation of deserted children.

Barnaul (bär-na-öl'), a town in Siberia, and capital of the important Altai mining district; has gold, copper and silver mines in its vicinity and many furnaces and smelters. Pop. 29,850.

Barnave (bär-näv), Antoine Pierre Joseph Marie, a distinguished French revolutionist, who successfully maintained against Mirabeau the right of the National Assembly as against that of the king to declare for peace or war, but afterwards asserted the inviolability of the king's person; was arrested, condemned, and guillotined. Born 1761; died 1793.

Barnes (bärnz), Albert, theologian, born in the State of New York in 1798. In 1825 he was ordained pastor of the Presbyterian Church of Morristown, New Jersey, and from 1830 till his death in 1870 had charge of the First Presbyterian Church in Philadelphia. He is chiefly known by his *Notes on the New Testament* and *Notes on the Old Testament*. He was tried for heresy because of his belief in universal atonement, and although acquitted the trial caused a split in the Presbyterian Church, a New School being established (1837).

Barnes, William, an English dialect poet and philologist, born in Dorsetshire in 1800; died in 1886. Of humble birth, he first entered a solicitor's office, then taught a school in Dorchester, and having taken orders became rector of Winterbourne Came in his native county and died there. He acquired a knowledge of many languages, and published works on Anglo-Saxon and English, *Poems of Rural Life* in the Dorset dialect, and *Rural Poems* in common English.

Barneveldt (bär'ne-velt), John van Olden, grand pensionary of Holland during the struggle with Philip II of Spain; born in 1549. After the assassination of William of Orange, and the conquest of the south provinces by the Spaniards under Parma, he headed the embassy to secure English aid. Finding, however, that the Earl of Leicester proved a worse than useless ally, he secured the elevation of the young Maurice of Nassau to the post of stadt-

holder, at the same time by his own wise administration doing much to restore the prosperity of the state. After serving as ambassador to France and England, he succeeded in 1607 in obtaining from Spain a recognition of the independence of the States, and two years later in concluding with her the twelve years' truce. Maurice, ambitious of absolute rule and jealous of the influence of Barneveldt, was interested in the continuance of the war, and lost no opportunity of hostile action against the great statesman. In this he was aided by the strongly-marked theological division in the state between the Gomarites (the Calvinistic and popular party) and the Arminians, of whom Barneveldt was a supporter. Maurice, who had thrown in his lot with the Gomarites, encouraged the idea that the Arminians were the friends of Spain, and procured the assembly of a synod at Dort (1618) which violently condemned them. Barneveldt and his friends Grotius and Hoogerbeets were arrested, and subjected to a mock trial; and Barneveldt, to whom the country owed its political existence and the commons their retention of legislative power, was beheaded on May 13th, 1619. His sons four years later attempted to avenge his death; one was beheaded, the other escaped to Spain.

Barnsley (barnz'lē), a town of England, W. Riding of Yorkshire. Its staple industries are the manufacture of linens, glass, iron, steel, and needles, and there are numerous collieries in the neighborhood. Pop. (1911) 50,623.

Barnstable (barn'sta-b'l), a seaport of Massachusetts, on a bay of the same name, a part of Cape Cod Bay. It is the county town of Barnstable Co., a sandy region, largely devoted to cranberry cultivation. The town has numerous vessels engaged in fisheries and the coast trade. Pop. 4600.

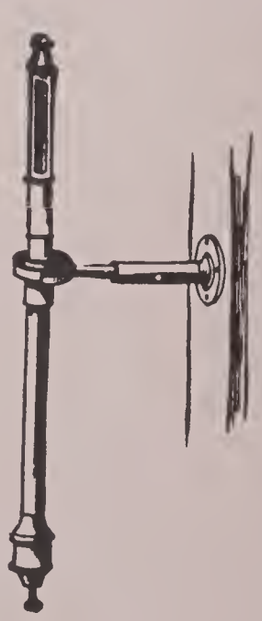
Barnstaple (bårn'sta-p'l), a seaport of England, county of Devon, on the right bank of the Taw, crossed by a 12th century bridge; manufactures of lace, paper, pottery, furniture, toys and turnery, and leather. Pop. (1911) 14,488.

Bar'num, PHINEAS T., a famous American showman, born at Bethel, Connecticut, in 1810; died in 1891. In 1841 he established a museum in New York City, devoted to real and pretended wonders and which won great celebrity. The most notable of his achievements was the bringing to America of the famous Swedish vocalist, Jenny Lind, who through her own powers and his skillful advertising was a great success. See his *Life*, written by himself.

Baroach. See *Broach*.

Baroda (bå-rō'då), a non-tributary state, but subordinate to the Indian government; situated in the north of the Bombay presidency. It consists of a number of detached territories in the province of Guzerat, and is generally level, fertile, and well cultivated, producing luxuriant crops of grain, cotton, tobacco, opium, sugar-cane, and oil-seeds. There is a famous breed of large white oxen used as draught cattle. Area 8226 sq. miles; pop. (est.) 1,953,000. The ruler is called the *Gaekwár*. The dissensions of the Baroda family have more than once called for British intervention, and in 1875 the ruling Gaekwár was tried and deposed in connection with the charge of attempt to poison the British resident.—BARODA, the capital, is the third city in the Bombay presidency. It consists of the city proper within the walls and the suburbs without, and is largely composed of poor and crowded houses, but has also some fine buildings, and is noted for its Hindu temples kept up by the state. Pop. 103,800 (including troops in the adjoining cantonment).

Barometer (ba-rom'e-tėr), an instrument for measuring the weight or pressure of the atmosphere and thus determining changes in the weather, the height of mountains, and other phenomena. It had its origin about the middle of the seventeenth century in an experiment of Torricelli, an Italian, who found that if a glass tube



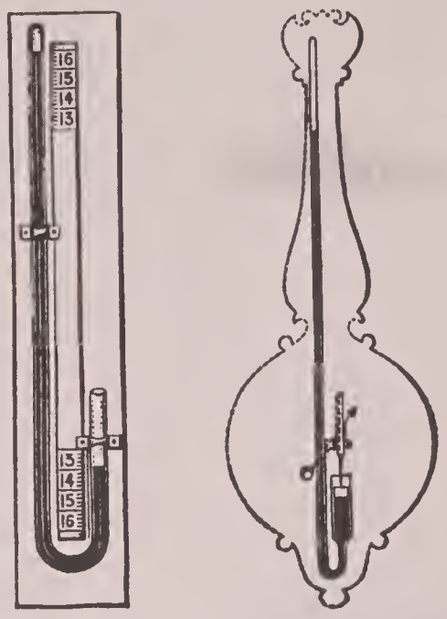
Marine Barometer.

Common Upright Barometer.

about 3 feet in length, open at one end only, and filled with mercury, was placed vertically with the open end in a cup of the same fluid metal, a portion of the mercury descended into the cup, leaving a column only about 30 inches in height in the tube. He inferred, therefore, that the atmospheric pressure on the surface of the mercury in the cup forced it up the tube to the height of 30 inches, and that this was so because the weight of a column of air from the cup to the top of the atmosphere was equal only to that of a column of mercury of the same base and 30 inches high. Pascal confirmed the conclusion in 1645; six years afterwards it was found by Perier that the height of the mercury in the Torricellian tube varied with the weather; and, in 1665, Boyle proposed to use the instrument to measure the height of mountains. The height of the barometer is expressed in English inches in England and America, but the metric system is used in all scientific work excepting meteorology. In France and most European countries the metric system is used.

The common or *cistern* barometer, which is a modification of the Torricellian tube, consists of a glass tube 33 inches in length and about one-third of an inch in diameter, hermetically sealed at the top, and having the lower end resting in a small vessel containing mercury, or bent upwards and terminating in a glass bulb partly occupied by the mercury and open to the atmosphere. The tube is first filled with purified mercury, and then inverted, and there is affixed to it a scale to mark the height of the mercurial column, which comparatively seldom rises above 31 or sinks below 28 inches. In general the rising of the mercury presages fair weather, and its falling the contrary, a great and sudden fall being the usual presage of a storm. Certain attendant signs, however, have also to be noted: thus, when fair or foul weather follows almost immediately upon the rise or fall of the mercury, the change is usually of short duration; while if the change of weather be delayed for some days after the variation in the mercury, it is usually of long continuance. The direction of the wind has also to be taken into account.

The *siphon* barometer consists of a bent tube, generally of uniform bore, having two unequal legs, the longer closed, the shorter open. A sufficient quantity of mercury having been introduced to fill the longer leg, the instrument is set upright, and the mercury takes such a position that the difference of the levels in the two legs represents the pressure of the atmosphere. In the best siphon barometers there are two scales, one for each leg, the divisions on one being reckoned



Siphon Barometer. Wheel Barometer.

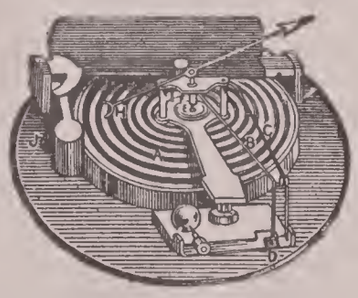
upwards, and on the other downwards from an intermediate zero point, so that the sum of the two readings is the difference of levels of the mercury in the two branches.

The *wheel* barometer is the one that is most commonly used for domestic purposes. It is far from being accurate, but it is often preferred for ordinary use on account of the greater range of its scale, by which small differences in the height of the column of mercury are more easily observed. It usually consists of a siphon barometer, having a float resting on the surface of the mercury in the open branch, a thread attached to the float passing over a pulley, and having a weight as a counterpoise to the float at its extremity. As the mercury rises and falls the thread and weight turn the pulley, which again moves the index of the dial.

The *mountain* barometer is a portable mercurial barometer with a tripod support and a long scale for measuring the altitude of mountains. To prevent breakage, through the oscillations of such a heavy liquid as mercury, it is usually carried inverted, or it is furnished with a movable basin and a screw, by means of which the mercury may be forced up to the top of the tube. For delicate operations, such as the measurement of altitudes, the scale of the barometer is furnished with a nonius or vernier, which greatly increases the minuteness and accuracy of the scale. For the rough estimate of altitudes the following rule

is sufficient:—As the sum of the heights of the mercury at the bottom and top of the mountain is to their difference, so is 52,000 to the height to be measured, in feet. (See also *Heights, Measurement of.*) In exact barometric observations two corrections require to be made, one for the depression of the mercury in the tube by capillary attraction, the other for temperature, which increases or diminishes the bulk of the mercury. In regard to the measurement of heights the general rule is to subtract the ten-thousandth part of the observed altitude for every degree of Fahrenheit above 32°.

In the *aneroid* barometer, as its name implies (Gr. *a*, not, *nēros*, liquid), no fluid is employed, the action being dependent upon the susceptibility to atmospheric pressure shown by a flat circular metallic chamber from which the air has been partially exhausted, and which has a flexible top and bottom of corrugated metal plate. By an ingenious arrangement of springs and levers the depression or elevation of the surface of the box is registered by an index on the dial, by which means it is also greatly magnified, being given in inches to correspond with the mercurial barometer. Aneroids are, however, generally less reliable than mercurial barometers, with which they should be frequently compared. The cut shows an aneroid without its case. A is the partially exhausted chamber, B a strong spring connected with its top and with the base-plate, C a lever from B connected through the bent lever D with the chain E coiled round F, and always kept tense by the spiral spring G. As the top of A rises or falls its motion is transmitted by B to the levers and chain so as to move the needle H. At J is seen the tube through which the air is drawn from A.



Aneroid Barometer.

Barometz (bar'ō-metz), a prostrate fern, which grows in the salt-plains near the Caspian Sea. It is covered with a yellow silky down, from which of old costly garments are said to have been woven. It is also known as the Tatar or Scythian Lamb, it bearing a rough resemblance to an animal and a hairy covering. The Russians formerly regarded it as at once plant and animal, believing it, while growing on a stalk, to have the organs and limbs of a lamb, to eat grass, and have other animal characteristics.

Baron (bär'un), originally, in the feudal system, the vassal or immediate tenant of any superior; but the term was afterwards restricted to the king's barons, and again to the greater of these only, who attended the Great Council, or who, at a later date, were summoned by writ to Parliament. It was the second rank of nobility, until dukes and marquises were introduced and placed above the earls, and viscounts were also set above the barons, who, therefore, now hold the lowest rank in the British peerage. The present barons are of three classes: (1) barons by prescription, whose ancestors have immemorially sat in the Upper House; (2) by patent; (3) by tenure, *i. e.* holding the title as annexed to land. The coronet is a plain gold circle with six balls or large pearls on its edge, the connected cap being of crimson velvet.—*Baron* and *feme*, a term used for husband and wife in the English law.—*Baron of beef*, two sirloins not cut asunder.

Baronet (bär'un-et), a hereditary dignity in Great Britain and Ireland, next in rank to the peerage, originally instituted by James I, in 1611, nominally to promote the colonization and defense of Ulster, each baronet, on his creation being originally obliged to pay into the treasury a sum of £1095, exclusive of fees. Baronets in Ireland were instituted in 1620, and in Scotland in 1625, the latter being called Baronets of Scotland and Nova Scotia, because their creation was originally intended to further the colonization of Nova Scotia But the baronets of Scotland and of Ireland have been baronets of the United Kingdom if created since 1707 and 1801, respectively. A baronet has the title of 'Sir' prefixed to his Christian and surname, and his wife is 'Lady' so-and-so. Baronets rank before all knights. They have as their badge a 'bloody hand' (the arms of Ulster), that is, a left hand, erect and open, cut off at the wrist, and red in color.

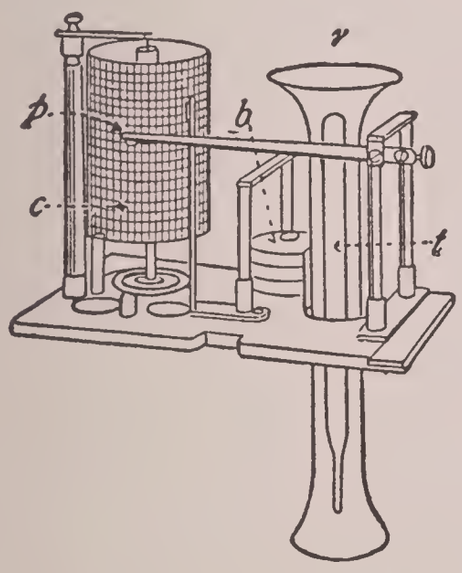
Baronius (ba-rō'ni-us), or BARONIO CÆSAR, an Italian ecclesiastical historian, born 1538; educated at Naples; in 1557 went to Rome; was one of the first pupils of St. Philip of Neri, and member of the oratory founded by him; afterwards cardinal and librarian of the Vatican Library. He owed these dignities to the services which he rendered the church by his *Ecclesiastical Annals*, comprising valuable documents from the papal archives, on which he labored from

the year 1580 until his death, June 30, 1607. They were continued, though with less power, by other writers, of whom Raynaldi takes the first rank.

Barons' War, the war carried on for several years by Simon de Montfort and other barons of Henry III against the king, beginning in 1263.

Barony (bar'un-i), a manor or landed estate under a baron, who formerly had certain rights of jurisdiction in his barony and could hold special courts. In Ireland baronies are still the chief subdivisions of the counties.

Barothermograph (bar-ō-thėr'mō-gråf), an apparatus for recording simultaneously the atmospheric pressure and temperature;



Assmann's Barothermograph.

b, aneroid barometer which gives horizontal motion to the cylinder, *c*; *t*, thermometer inside a protecting tube, *r*, which gives vertical motion to the pen, *p*.

a combination of barograph and thermograph, especially such as are made portable and very light to be sent up with kites and sounding-balloons.

Barouche (ba-rösh'), a four-wheeled carriage with a falling top and two inside seats in which four persons can sit, two fronting two.

Barque (bärk), a three-masted vessel of which the foremast and mainmast are square-rigged, but the mizzenmast has fore-and-aft sails only.

Barquesimeto (bår-kā-sē-mā'tō), a city in the north of Venezuela, capital of the state of Lara. Population about 15,000.

Barr, Amelia Edith, a novelist, born in Ulverston, England, in 1831. Marrying Robert Barr, she went to Texas in 1854, and was left a widow in 1867. She then removed to New York, engaged in writing for periodicals, and after 1880 produced many novels, some of them very popular. Among the best known are *Jan Vedder's Wife*, *A Bow of Orange Ribbon*, *The Lone House*, and *Friend Olivia*. Died March 10, 1919.

Barr, Robert, a Scottish novelist, born in Glasgow in 1850. He lived for a time in America, engaged on the Detroit *Free Press*. In 1881 he went to England, where he wrote under the name of 'Luke Sharp.' Among his numerous tales are *In a Steamer Chair*, *The Face and the Mask*, *In the Midst of Alarms*. *The Mutable Many*, *Tekla*, etc. With Jerome K. Jerome he founded the *Idler* magazine in 1892. He died in 1912.

Barra (bår'rå), a town of Italy, about 3 miles east of Naples. Pop. 11.975.

Barra, or Bar, a small kingdom in Africa, near the mouth of the Gambia. The Mandingoes, who form a considerable part of the inhabitants, are Mohammedans and the most civilized people on the Gambia. Pop. 200,000. It is part of the British colony of Gambia.

Barra, an island of the Outer Hebrides, W. coast of Scotland, belonging to Inverness-shire; 8 miles long and from 2 to 5 broad, of irregular outline, with rocky coasts, surface hilly but furnishing excellent pasture. On the W. coast the Atlantic, beating with all its force, has hollowed out vast caves and fissures. Large herds of cattle and flocks of sheep are reared on the island. The coast waters of this and adjacent islands abound with fish, and fishing is an important industry. Pop. about 2500.

Barracan (bår'a-kan), strictly, a thick strong stuff made in Persia and Armenia of camel's hair, but the name has been applied to various wool, flax, and cotton fabrics.

Barrack (bär'ak; Spanish *barraca*), originally a small cabin or hut for troops, but now applied to the permanent buildings in which troops are lodged.

Barrackpur (bär-ak-pör'), a town and military cantonment, Hindustan, on the left bank of the Hooghly, 15 miles N. N. E. of Calcutta. The suburban residence of the viceroy is in Barrackpur Park. Pop. 17,700.

Barracoon (bår'a-kön), a negro barrack or slave depot, formerly plentiful on the west coast of Africa, in Cuba, Brazil, etc.

Barrafran'ca, a town of Sicily, prov. Caltanissetta. Pop. 10,878.

Barrage (bär-razh), or curtain-fire. See *Artillery.*

Barramunda. See *Ceratodus.*

Barranquilla (bär-rän-kēl′yä), a port of South America, in Colombia, on a branch of the river Magdalena, near its entrance into the Caribbean Sea, connected by rail with the seaport Sabanilla. Pop. about 48,000.

Barras (bä-rä), Paul François Jean Nicholas, Comte de, member of the French national convention and of the executive directory, born in Provence 1755; died in 1829. After serving in the army in India and Africa, he joined the revolutionary party and was a deputy in the tiers-état. He took part in the attack upon the Bastille and upon the Tuileries, and voted for the death of Louis XVI. In the subsequent events he displeased Robespierre, and on this account joined the members of the committee, who foresaw danger awaiting them, and being entrusted with the chief command of the forces of his party he succeeded in the overthrow of Robespierre. On Feb. 4, 1795, he was elected president of the convention, and on Oct. 5, when the troops of the sections which favored the royal cause approached, Barras for a second time received the chief command of the forces of the convention. On this occasion he employed General Bonaparte, for whom he procured the chief command of the army of the interior, and afterwards the command of the army in Italy. From the events of the 18th Fructidor (Sept. 4, 1797) he governed absolutely until the 13th June, 1799, when Siéyès entered the directory, and in alliance with Bonaparte procured his downfall in the revolution of the 18th Brumaire (Nov. 9, 1799). He afterwards resided at Brussels, Marseilles, Rome, and Montpellier under surveillance, returning to Paris only after the restoration of the Bourbons.

Barratry (bär′a-tri), in commerce, any fraud committed by the master or mariners of a ship, whereby the owners, freighters, or insurers are injured, as by evading foreign port duties; deviation from the usual course of the voyage, by the captain, for his own private purposes; trading with an enemy, whereby the ship is exposed to seizure; willful violation of a blockade; willful resistance of search by a belligerent vessel, where the right of search is legally exercised; fraudulent negligence; embezzlement of any part of the cargo, etc.

Barratry, Common, in law, the stirring up of lawsuits and quarrels between other persons, the party guilty of this offense being indictable as a *common barrator* or *barretor.* The commencing of suits in the name of a fictitious plaintiff is common barratry.

Barre (bär′rē), a city of Washington Co., Vermont, the seat of Goddard Seminary. It is the granite center of the United States, has extensive quarries, also manufactures of foundry products, stone-cutters' tools, etc. Pop. 10,008.

Barrel (bar′el), a well-known variety of wooden vessel; also used as a definite measure and weight. A barrel of beer is 36 gals., of flour 196 lbs., of beef or pork 200 lbs.

Barrel-organ, a musical instrument usually carried by street musicians, in which a barrel studded with pegs or staples, when turned round, opens a series of valves to admit air to a set of pipes, or acts upon wire strings like those of the piano, thus producing a fixed series of tunes.

Barrett (bar′et), Lawrence (Brannigan), a leading actor, son of an Irish mechanic, born in Paterson, New Jersey, in 1838. He showed as an amateur his special talent while working in a store, went on the professional stage in 1854, and soon reached front rank in his profession. Was closely associated with Edwin Booth, whose *Life* he wrote. Died in 1891.

Barrett, Wilson, an English actor, novelist, dramatist and poet, born in 1846; died in 1904; is best remembered for his great spectacular play. *The Sign of the Cross.*

Barricade (bär′i-kād), an obstruction hastily raised to defend a narrow passage, such as a street, defile, or bridge. When beams, chains, chevaux-de-frise and prepared materials are wanting, wagons, barrows, casks, chests, branches of trees, paving-stones, etc., are available for the purpose. They have been frequently used in popular outbursts, especially in Paris, though their accessibility to attack by breaking through the houses of adjoining streets makes a prolonged tenure impossible.

Bar′rie, a town of Ontario, Canada, on the Grand Trunk R. R. 64 miles N. N. W. of Toronto, on an arm of Lake Simcoe. It has planing mills, a tannery, carriage works, gas engine works, flour mills, etc. Pop. (1911) 6468.

Barrie, Sir James Matthew, a Scotch author, born at Kirriemuir, in 1860. Became a journalist in London in 1885. He showed marked humor and pathos in *A Window in Thrums* and *The Little Minister,* the latter being dramatized in 1897. Other works are *Sentimental Tommy, Margaret Ogilvy,*

Tommy and Grizel, Peter Pan in Kensington Gardens, Peter and Wendy, etc. His dramatic works include, *The Professor's Love Story, The Wedding Guest, Quality Street, The Admirable Crichton, Little Mary, Peter Pan, Alice Sit-by-the-Fire, What Every Woman Knows*, etc.

Barrier Treaty, the name given to three treaties, 1709 and 1713 and 1715, between Great Britain and Holland, by which in exchange for certain guarantees England engaged to procure an adequate barrier on the side of the Netherlands.

Barrington (bär'ing-ton), Daines, son of Viscount Barrington, lawyer, antiquarian, and naturalist; born in 1727; died in 1800. He wrote many papers for the Royal Society and the Society of Antiquaries; published some separate works, and was a correspondent of White of Selborne.

Barrister (bär'is-tẽr), in England or Ireland, an advocate or pleader, who has been admitted by one of the Inns of Court, viz., the Inner Temple, Middle Temple, Lincoln's Inn, or Gray's Inn, to plead at the bar. It is they who speak before all the higher courts, being instructed in regard to the case they have in hand by means of the *brief* which they receive from the solicitor who may happen to engage their services. Barristers are sometimes called *utter* or *outer barristers*, to distinguish them from the king's counsel, who sit within the bar in the courts and are distinguished by a silk gown. Barristers are also spoken of as *counsel*, as in the phrase *opinion of counsel*, that is, a written opinion on a case obtained from a barrister before whom the facts have been laid. All judges are selected from the barristers. A barrister cannot maintain an action for his fees, which are considered purely honorary. A *revising barrister* is a barrister appointed to revise the list of persons in any locality who have a vote for a member of Parliament. The term corresponding to barrister is in Scotland *advocate*, in the United States *counselor-at-law;* but the position of the latter is not quite the same.

Barros (bär'os), Joao de, a Portuguese historian; born in 1496. He was attached to the court of King Emmanuel, who, after the publication in 1520 of Barros's romance, *The Emperor Clarimond*, urged him to undertake a history of the Portuguese in India, which appeared thirty-two years later. King John III appointed Barros governor of the Portuguese settlements in Guinea, and general agent for these colonies, further presenting him in 1530 with the province of Maranham in Brazil, for the purpose of colonization. For his losses by the last enterprise the king indemnified him, and he died in retirement in 1570. Besides his standard work, *Asia Portuguesa*, he wrote a moral dialogue on compromise, and the first *Portuguese Grammar*.

Barrosa (bar-rō'sa), a village of Spain, near the S.W. coast of Andalusia, near which General Graham, when abandoned by the Spaniards, defeated a superior French force in 1811.

Barrow (bar'rō), a river in the southeast of Ireland, province Leinster, rising on the borders of the King's and Queen's Counties, and after a southerly course joining the Suir in forming Waterford harbor. It is next in importance to the Shannon, and is navigable for vessels of 200 tons for 25 miles above the sea.

Barrow, Isaac, an eminent English mathematician and divine, born in London in 1630, studied at the Charterhouse and at Trinity College, Cambridge, of which he became a fellow in 1649. After a course of medical studies he turned to divinity, mathematics, and astronomy, graduated anew at Oxford in 1652, and, failing to obtain the Cambridge Greek professorship, went abroad. In 1659 he was ordained; in 1660 elected Greek professor at Cambridge; in 1662 professor of geometry in Gresham College; and in 1663 Lucasian professor of mathematics at Cambridge, a post which he resigned to Newton in 1669. In 1670 he was created D.D., in 1672 master of Trinity College, and in 1675, vice-chancellor of Cambridge University. He died in 1677. His principal mathematical works (written in Latin) were: *Euclidis Elementa*, 1655; *Euclidis Data*, 1657; *Mathematicæ Lectiones*, 1664; *Lectiones Opticæ*, 1669; *Lectiones Geometricæ*, 1670; *Archimedis Opera; Apollonii Conicorum*, lib. iv.; *Theodosii Spherica*, 1675. All his English works, which are theological, were left in MS., and published by Dr. Tillotson in 1685. As a mathematician Barrow was deemed inferior only to Newton.

Barrow, Sir John, geographer and man of letters, born in 1764 in Lancashire. At the age of sixteen he went in a whaler to Greenland; was subsequently teacher of mathematics in a school at Greenwich; and was sent with Lord Macartney in his embassy to China in 1792. His knowledge of Chinese affairs was highly esteemed by the British government. The account of this journey was of great value, and not less so was the account of his travels

in South Africa, whither he went in 1797 as secretary to Macartney. In 1804 he was appointed second secretary to the admiralty, a post occupied by him for forty years. In 1835 he was made a baronet; and he died in 1848, three years after his retirement. Besides the accounts of his own travels he published lives of Earl Macartney, Lord Anson, Lord Howe, and Drake; *Voyages of Discovery and Research within the Arctic Regions;* an autobiography of himself written at the age of eighty-three, etc.

Barrow-in-Furness, a seaport and parliamentary borough of Lancashire, in the district of Furness, opposite the island of Walney, a town that had increased from a fishing hamlet with 100 inhabitants in 1848 to a town of 63,775 inhabitants in 1911. Its prosperity is due to the mines of red hematite iron-ore which abounds in the district, and to the railway rendering its excellent natural harbor available. It has several large docks, and an extensive trade in timber, cattle, grain, flour, iron-ore and pig-iron. It has numerous blast-furnaces, and one of the largest Bessemer-steel works in the world. Besides iron-works a large business is done in shipbuilding, the making of railway wagons and rolling stock, ropes, sails, bricks, etc. Pop. in 1918, 80,000.

Barrows, Samuel June (1845-1909), an American clergyman and author, born in New York. He was engaged in newspaper work for a time and became private secretary to William H. Seward in 1867. He entered the Harvard Divinity School in 1871, graduating in 1874. In 1873, while acting as a correspondent for the New York *Tribune*, he accompanied General Stanley's Yellowstone expedition, and in the following year accompanied General Custer's Black Hills expedition. In 1876 he became pastor of the First Unitarian Church, Dorchester, Mass., remaining there till 1881, when he became editor of the *Christian Register*. In 1897 he was elected to Congress from the 10th Massachusetts district. Among his published works are *The Doom of the Majority of Mankind, Shaybacks in Camp, Crimes and Misdemeanors in the United States, Isles and Shrines of Greece.*

Barrows, mounds of earth or stones raised to mark the resting place of the dead, and distinguished, according to their shape, as *long, bowl, veil, cone, broad* barrows. The practice of barrow-burial is of unknown antiquity and almost universal, barrows being found all over Europe, in Northern Africa, Asia Minor, and elsewhere in Asia, and North America. In the earliest barrows the inclosed bodies were simply laid upon the ground, with stone or bone implements and weapons beside them. In barrows of later date the remains are generally inclosed in a stone cist. Frequently cremation preceded the erection of the barrow, the ashes being inclosed in an urn or cist.

Barrow Strait, the connecting channel between Lancaster Sound and Baffin Bay on the E. and Melville Sound on the W. Of great depth, with rocky and rugged shores. Named after Sir John Barrow.

Barry (bar'i), in Heraldry, the term applied to a shield which is divided transversely into four, six or more equal parts, the tincture of which it consists being disposed interchangeably. *Barry* is when the shield is divided into four, six or more equal parts by diagonal lines, the tincture of which it consists being varied interchangeably. *Barry-bendy* is where the shield is both barred and bended, dividing the field into lozenge shapes. *Barry-pily* is where the shield is divided by bars and diagonal lines into piles or wedge shapes.

Barry, Sir Charles, an English architect, born at London in 1795. After executing numerous important buildings, such as the Reform Club-house, London, King Edward's School, Birmingham, etc., he was appointed architect of the new Houses of Parliament at Westminster, a noble pile, with the execution of which he was mainly occupied for more than twenty years. He was knighted in 1852, and died suddenly in 1860. His son, Edward Middleton, R. A. (1830-1880), was also a distinguished architect, and produced many important buildings.

Barry, Comtesse du. See *Du Barry.*

Barry Cornwall, the assumed name of Bryan Waller Procter.

Barry, James, a painter and writer, born at Cork, Ireland, in 1741, studied abroad with the aid of Burke; was elected Royal Academician on his return; and worked seven years on the paintings for the hall of the Society for the Encouragement of the Arts. In 1773 he published his *Inquiry into the Real and Imaginary Obstructions to the Increase of the Arts in England;* and in 1782 was elected professor of painting to the Academy. He was expelled in 1797 on the ground of his authorship of the *Letter to the Society of Dilettanti.* His chief painting was his *Victors at Olympia.* He died in 1806.

Barry, John, a naval officer of the American revolution, born in

Co. Wexford, Ireland, in 1745. Was captain of a merchantman trading to Philadelphia when the war broke out; appointed captain of the brig, *Lexington*, in February, 1776, captured the first prize the following April; won fame by capturing the armed schooner *Alert* in Delaware Bay with a few men in some rowboats; continued in active and successful service until the close of the war, and was victor in the last battle of the war in 1782. When Congress provided for a United States navy, he was selected, in 1794, as its first commander, and is therefore justly called the Father of the American Navy. He died at Philadelphia in 1803. A statue in his honor has been erected in Independence Square, Philadelphia.

Bar-shot, a double-headed shot consisting of two pieces connected by a bar.

Bart, BARTH, or BAERT (bärt), JEAN, a famous French sailor, born at Dunkirk, 1650, the son of a poor fisherman. He became captain of a privateer, and after some brilliant exploits was appointed captain in the royal navy. In recognition of his further services he was made commodore, subsequently receiving letters of nobility. Brusque, if not vulgar in manner, and ridiculed by the court for his indifference to ceremony, he made the navy of the nation everywhere respected, and furnished some of the most striking chapters in the romance of naval warfare. After the peace of Ryswick he lived quietly at Dunkirk, and died there while equipping a fleet to take part in the war of the Spanish Succession, 1702.

Bartas (bär-tä), GUILLAUME DE SALLUSTE DU, a French poet, termed 'the divine' by contemporary English writers; born in 1544. Principal work, *La Sepmaine* ('The Week'), a poem on the creation, translated into English by Sylvester. Died of wounds received at Ivry, in 1590.

Bartfeld (bart-felt), or BARTFA, an old town, Hungary, county of Saros, on the Topla, with mineral springs in the neighborhood. Pop. 6100.

Barth (bärt). HEINRICH, an African traveler, born at Hamburg in 1821; died in 1865. He was graduated at the University of Berlin as Ph.D. in 1844; and set out in 1845 to explore all the countries bordering on the Mediterranean. The first volume of his *Wanderungen durch die Küstenländer des Mittelmeeres* was published in 1849, in which year he was invited by the English government to join Dr. Overweg in accompanying Richardson's expedition to Central Africa. The expedition set out from Tripoli in February, 1850, and in spite of the death both of Richardson and Overweg, Barth did not return to Tripoli till the autumn of 1855. His exploration, which extended over an area of about 2,000,000 square miles, determined the course of the Niger and the true nature of the Sahara. The English account of it was entitled *Travels and Discoveries in North and Central Africa* (5 vols. 1857-58). An important work on the African languages was left unfinished.

Barthélemy (bär-tāl-mē), JEAN JACQUES, a French author, born in 1716. He was educated under the Jesuits, for holy orders, but declined all offers of clerical promotion above the rank of *Abbé*. He gained considerable repute as a worker in philology and archæology; and after his appointment as director of the Royal Cabinet of Medals, in 1753, spent some time traveling in Italy, collecting medals and antiquities. His best-known work, not inaptly characterized by himself as an unwieldy compilation, was the *Travels of the Younger Anacharsis in Greece*. It was very popular and was translated into various tongues. Though taking no part in the revolution he was arrested on a charge of aristocracy in 1793, but was set at liberty, and subsequently offered the post of librarian of the National Library. He died in 1795.

Barthélmy-Saint-Hilaire (bär-tāl-mē-saṇ-tē-lār), JULES, a French scholar and statesman, born in 1805; died in 1895. He was professor of Greek and Latin philosophy in the College of France, but resigned the chair after the coup d'état of 1852 and refused to take the oaths; was reappointed in 1862; in 1869 was returned to the Corps Législatif; after the revolution was a member of the National Assembly; was elected senator for life in 1875. He published a translation of Aristotle, and works on Buddhism, Mohammed and Mohammedanism, the Vedas, etc.

Barthez (bär-tā), PAUL JOSEPH, an eminent French physician, born at Montpellier 1734; died 1806. At Montpellier he founded a medical school, which acquired a reputation throughout all Europe. Having settled in Paris he was appointed by the king consulting physician, and by the Duke of Orleans his first physician. The revolution deprived him of the greatest part of his fortune and drove him from Paris, but Napoleon brought him forth again, and loaded him in his advanced age with dignities. Among his numerous writings

may be mentioned *Nouvelle Mécanique des Mouvemens de l'Homme et des Animaux; Traitement des Maladies Goutteuses; Consultations de Médecine*, etc.

Bartholdi (bär-tol'dē), AUGUSTE, a French sculptor, born in 1833; best known as the artist of the colossal statue of *Liberty Enlightening the World*, erected on one of the islands in the harbor of New York. Died October 4, 1904.

Bartholin (bär'to-lin), KASPAR, a Swedish writer, born in 1585; died in 1629. He studied medicine, philosophy, and theology; was made Doctor of Medicine at Basel in 1610, rector of the University of Copenhagen 1618, and professor of theology 1624. His *Institutiones Anatomicæ* was for long a standard text-book in the universities. His son, THOMAS, born at Copenhagen 1616, died 1680, was equally celebrated as a philologist, naturalist, and physician. He was professor of anatomy at Copenhagen, 1648; physician to the king, Christian V, in 1670, and councilor of state, 1675. His sons, KASPAR (born 1655; died 1738) and THOMAS (born 1659; died 1690) were also highly distinguished—the first as an anatomist, the other as an archæologist. The former's name is associated with the description of one of the ducts of the sublingual gland and of the *glandulæ Bartolini*.

Bartholomew (bar-thol'ō-mū), the apostle, is probably the same person as *Nathanael*, mentioned in the Gospel of St. John as an upright Israelite and one of the first disciples of Jesus. He is said to have taught Christianity in the south of Arabia, and was, according to Eusebius, flayed alive and crucified head downwards at Albanopolis in Armenia. The ancient church had an apocryphal gospel bearing his name, of which nothing has been preserved. A festival is held to his memory on August 24 in the Anglican and Roman churches, June 11 in the Greek Church.

Bartholomew, ST., an island, one of the West Indies, in the Leeward group, belonging to France, to which it was transferred by Sweden in 1878; about 24 miles in circumference. It produces some tobacco, sugar, cotton, indigo, etc. Pop. about 3000. The capital is Gustavia.

Bartholomew Fair, a celebrated fair, established in the reign of Henry I, formerly held in West Smithfield, London, on St. Bartholomew's Day (August 24, o. s.), but abolished since 1855.

Bartholomew's Day, ST., a feast of the Church of Rome, celebrated (August 24) in honor of St. Bartholomew.

Bartholomew, St., Massacre of, the slaughter of the French Protestants or Huguenots, which began in Paris on 24th August, 1572, under secret orders from Charles IX, at the instigation of his mother, Catharine de' Medici, and in which, according to Sully, 70,000 Huguenots, including women and children, were murdered in France. Atrocious as the matter was, recent research has shown this figure to be a gross exaggeration. During the minority of Charles and the regency of his mother a long war raged in France between the Catholics and Huguenots, the leaders of the latter being the Prince of Condé and Admiral Coligny. In 1570 overtures were made by the court to the Huguenots, which resulted in a treaty of peace. The king appeared to have entirely disengaged himself from the influence of the Guises and his mother; he invited Coligny to his court, and honored him as a father. It is probable that the queen mother premeditated the murder of the admiral and other leaders of his party, but not a general massacre. The king's sister had just been married to Henry, King of Navarre. On Aug. 22 a shot from a window wounded the admiral. The following night Catharine held the bloody council, which fixed the execution for the night of St. Bartholomew, Aug. 24, 1572. After the assassination of Coligny a bell from the tower of St. Germain l'Auxerrois at midnight gave to the assembled companies of burghers the signal for the general massacre of the Huguenots. The Prince of Condé and the King of Navarre saved their lives by going to mass and pretending to embrace the Catholic religion. By the king's orders the massacre was extended throughout the whole kingdom; and the horrible slaughter continued for thirty days in almost all the provinces. There were many illustrious victims, among them being Admiral Coligny, his son-in-law, Charles de Téligny, and the logician Peter Ramus. Catharine de' Medici received the congratulations of all the Catholic powers, and Pope Gregory XIII commanded bonfires to be lighted and a medal to be struck.

Bartholomew's Hospital, ST., one of the great hospitals of London, formerly the priory of St. Bartholomew, and made a hospital by Henry VIII in 1547. On an average, 6000 patients are annually admitted to the hospital, while about 100,000 out-patients are relieved by it. A medical school is attached to it.

Bartizan (bär'ti-zan), a small overhanging turret pierced with one or more apertures for archers, projecting generally from the angles on the top of a tower, or from the parapet, or elsewhere, as in a medieval castle.

Bartlesville (bar'tlz-vil), a city, county seat of Washington Co., Oklahoma, in the N. E. part of the State; center of an extensive oil and gas field. It has large smelters, foundries, machine shops, etc. Commission form of government. Pop (1920) 14,417.

Bartlett, Paul Wayland, American sculptor, born 1865; son of Truman H. Bartlett, art critic and sculptor. At fifteen years of age began study under Frémiet at Paris. Won a Paris Salon medal in 1887. Among his works are *The Bear Tamer*, in the Metropolitan Museum, New York; equestrian statue of Lafayette, in the Place du Carrousel, Paris, presented by the school children of America to the French Republic; equestrian statue of McClellan, Philadelphia, and sculptures in the Congressional Library at Washington.

Bartolini (bär-to-lē'nē), Lorenzo, a celebrated Italian sculptor, born in Tuscany about 1778; died in 1850. He studied and worked in Paris, and was patronized by Napoleon. On the fall of the empire he returned to Florence, where he continued to exercise his profession. Among his greater works may be mentioned his groups of *Charity*, and *Hercules* and *Lichas* and a colossal bust of Napoleon. Bartolini ranks next to Canova among modern Italian sculptors.

Bartolommeo (bär-to-lom-mā'o), Fra. See *Baccio della Porta.*

Bartolozzi (-lot'sē), Francesco, a distinguished engraver, born at Florence in 1725, or, according to others, in 1730; died at Lisbon in 1813. In Venice, in Florence, and in Milan he etched several pieces on sacred subjects, and then went to London, where he received great encouragement. After forty years' residence in London he went to Lisbon on the invitation of the Prince Regent of Portugal to take the superintendence of a school of engravers, and remained there till his death.

Barton, Andrew, one of Scotland's first great naval commanders; flourished during the reign of James IV, and belonged to a family which for two generations had produced able and successful seamen. After doing considerable damage to English shipping he was killed in an engagement with two ships which had been specially fitted out to fight against him (1511).

Barton, Benjamin Smith, born 1776; died 1815. An American physician, naturalist and ethnologist. He wrote *New Views on the Origin of the Tribes of America*, etc.

Barton, Bernard, known as the Quaker poet, born at London in 1784; died in 1849. In 1806 he removed to Woodbridge, in Suffolk, where he was long clerk in a bank. He published *Metrical Effusions* (1812); *Poems by an Amateur* (1818); *Poems* (1820); *Napoleon, and other Poems* (1822); *Poetic Vigils* (1824); *Devotional Verses* (1826); *A New Year's Eve, and other Poems* (1828); besides many contributions to the annuals and magazines. His poetry, though deficient in force, is pleasing, fluent, and graceful.

Barton, Clara, American philanthropist, born at Oxford, Massachusetts, in 1821. She began her career as a teacher, and in 1854 became a clerk in the patent office at Washington. This position she resigned when the Civil War broke out, when she became a volunteer nurse in the army hospitals and on the battlefield. In 1870, during the Franco-German war, she aided the Grand Duchess of Baden in preparing military hospitals, assisted the Red Cross Society, and superintended the distribution of work to the poor of Strasburg in 1871 and of Paris in 1872. At the close of the war, she was decorated with the Golden Cross of Baden and the Iron Cross of Germany. On the organization of the American Red Cross Society in 1881, she was made its president. In 1889 she had charge of movements in behalf of sufferers from the flood at Johnstown, Pa.; in 1892 distributed relief to the Russian famine sufferers; in 1896 personally directed relief measures at the scenes of the Armenian massacres; in 1898 took relief to the Cuban reconcentrados, and performed field work during the war with Spain. During the distress following the Galveston flood in 1900 she had personal direction of the relief work. Her writings include *History of the Red Cross* (1883), *History of the Red Cross in Peace and War* (1898), *Story of My Childhood* (1907). She died April 12, 1912. Consult William Eleazar Barton's *Life of Clara Barton* (1922).

Barton, Elizabeth, a country girl of Aldington, in Kent (commonly called the Nun or Maid of Kent), who gained some notoriety in the reign of Henry VIII. She was subject to epileptic fits, and was persuaded by certain priests that she was a prophetess inspired by God. Among other things she prophesied that Henry, if he persisted in his purpose of divorce and second marriage, would not be king for seven months longer, and would die a shameful death.

and be succeeded by Catherine's daughter. On arrest she confessed herself an imposter, and she and six others were executed April 20, 1534.

Barton, WILLIAM, American soldier, born in Rhode Island, 1748. He was lieutenant-colonel in the Rhode Island militia, and for meritorious service was made colonel in the Continental army. Died 1831.

Barton-upon-Humber, a town of England, in Lincolnshire, on the Humber. It contains two old churches, one of which is an undoubted specimen of Anglo-Saxon architecture. Pop. (1911) 6676.

Bartram, JOHN, botanist, born in Delaware Co., Pennsylvania, in 1699. He engaged in botanical study and eventually established a botanical garden on the Schuylkill, near Philadelphia, which he enriched with rare plants, and which is now a public garden. He was a member of several learned societies. He died in 1777.—WILLIAM BARTRAM, his son, born 1739, continued the studies of his father, and traveled through the South in search of new plants, writing a work in description of his journey, in which he gave an account of the Creek, Choctaw and Cherokee Indians, contributing much new matter to the existing history of those tribes. In 1771 he settled in Philadelphia, where he died in 1823. He made the most complete list of American birds before the work of Wilson.

Bartsch (bärch), KARL FRIEDRICH, one of the most profound students of the old German and Romance literatures, was born at Sprottau, Germany, in 1832; died in 1888. He studied at Berlin, Paris, Oxford, etc., and was professor of philology in Rostock and Heidelberg. His labors have been of immense service in elucidating the older literature and language of his native country as well as in the field of the Romance tongues. He edited a great number of German, Romance and French poems, tales, etc., of the early medieval period and published various text-books and critical treatises on the subject of his studies. Among his publications were editions of the *Nibelungenlied*, *Walther Von der Vogelweide*, *Kudrun*, etc.; *Chrestomathie de l'ancien Français; Provençalisches Lesebuch;* translations of Burns, of Dante, etc.

Baru (ba'rö), a woolly substance used for caulking ships, stuffing cushions, etc., found at the base of the leaves of an East India sago palm.

Baruch (bā'ruk; literally 'blessed'), a Hebrew scribe, friend and assistant to the prophet Jeremiah. At the captivity, after the destruction of Jerusalem, Jeremiah and Baruch were permitted to remain in Palestine, but were afterwards carried into Egypt, B. C. 588. His subsequent life is unknown. One of the apocryphal books bears the name of Baruch. The Council of Trent gave it a place in the canon, but its authenticity was not admitted either by the ancient Jews or the early Christian fathers.

Barwood, a dyewood obtained from *Baphia nitida*, a tall tree of West Africa. It is chiefly used for giving orange-red dyes on cotton yarns. See *Camwood.*

Baryta (ba-rī'ta), oxide of barium, called also *heavy earth*, from its being the heaviest of the earths, its specific gravity being 5.7. It is generally found in combination with sulphuric and carbonic acids, forming sulphate and carbonate of baryta, the former of which is called *heavy-spar.* Baryta is a gray powder, has a sharp, caustic, alkaline taste, and a strong affinity for water, and forms a hydrate with that element. It forms white salts with the acids, all of which are poisonous except the sulphate. Several mixtures of sulphate of baryta and white lead are manufactured, and are used as white pigments, or it may be used alone. Carbonate of baryta, which in the natural state is known as witherite, is also used as the base of certain colors. The nitrate is used in pyrotechny, in the preparation of green fireworks, the metal barium burning with a green flame.

Basalt (ba-salt'), a well-known igneous rock occurring in the ancient trap and the recent volcanic series of rocks, but most abundantly in the former. It is a fine-grained heavy, crystalline rock, consisting of felspar, augite, and magnetic iron, and sometimes contains a little olivine. Basalt is amorphous, columnar, tabular, or globular. The columnar form is straight or curved, perpendicular or inclined, sometimes nearly horizontal; the diameter of the columns from 3 to 18 inches, sometimes with transverse semispherical joints, in which the convex part of one is inserted in the concavity of another; and the height from 5 feet to 150. The forms of the columns generally are pentagonal, hexagonal, or octagonal. When decomposed it is found also in round masses, either spherical or compressed

Basalt—Giant's Causeway.

and lenticular. These rounded masses are sometimes composed of concentric layers, with a nucleus, and sometimes of prisms radiating from a center. Fingal's Cave, in the island of Staffa, furnishes a remarkable instance of basaltic columns. The pillars of the Giant's Causeway, Ireland, composed of this stone, and exposed to the roughest sea for ages, have their angles as perfect as those at a distance from the waves. The Palisades, on the Hudson at New York, are composed of basalt. Basalt often assumes curious and fantastic forms, as for example the mass popularly known as 'Sampson's Ribs' at Arthur's Seat, Edinburgh.

Baschi (bâs'kē), MATTEO, an Italian Minorite friar of the convent of Montefalcone, founder and first general of the Capuchin branch of the Franciscans. He died at Venice in 1552.

Bascinet, BAS'INET or BAS'NET, a light helmet, sometimes with, but more frequently without, a visor, in general use in England and on the Continent during the Middle Ages.

Bascom, JOHN, an American author, born at Genoa, New York, in 1827; graduated at Williams College in 1849 and at Andover Seminary in 1855; professor of rhetoric at Williams College 1855–74; president of the University of Wisconsin 1874–87; afterwards professor of political science at Williams. His works include *Principles of Psychology*, *Philosophy of Religions*, *Ethics*, *Natural Theology*, *The Science of Mind*, etc. Died 1911.

Base (bās), in architecture, that part of a column between the top of the pedestal and the bottom of the shaft; where there is no pedestal, the part between the bottom of the column and the pavement. The term is also applied to the lower projecting part of the wall of a room, consisting of a plinth and its moldings.

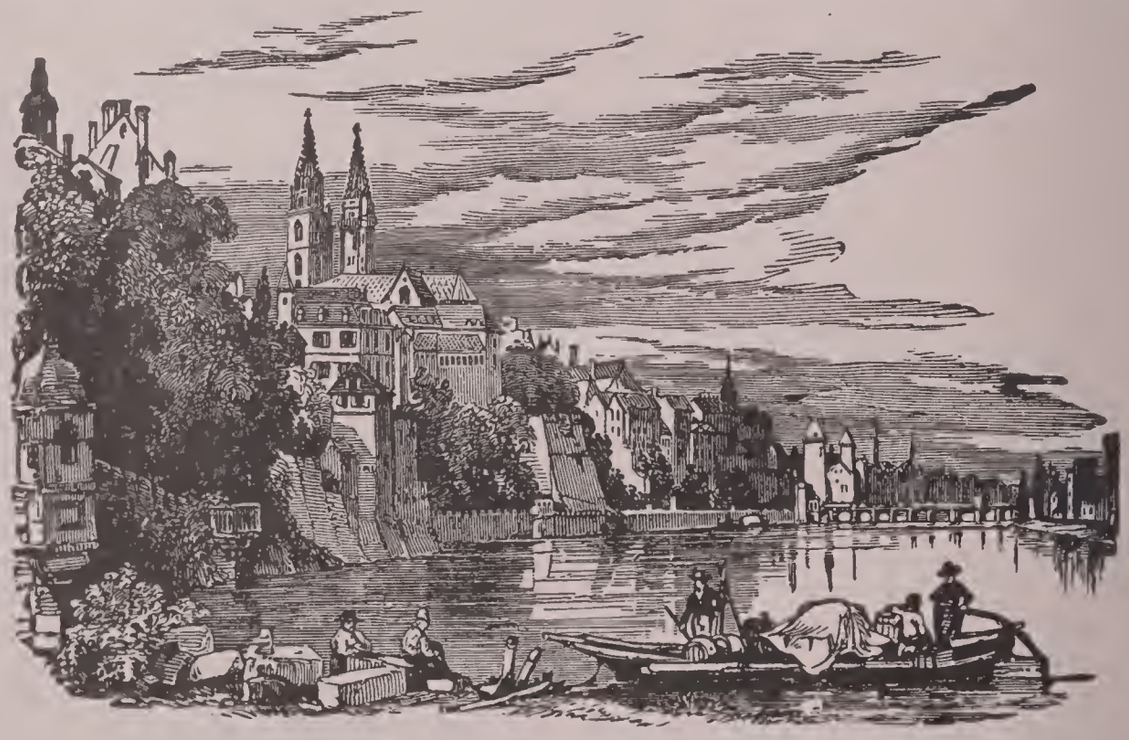
Base, in chemistry, a term applied to the elements or compound substances which unite with acids to form salts.

Base, or BASIS, a term in tactics, signifying the original line on which an offensive army forms; the frontier of a country, a river, or any safe position from which an army takes the field to invade an enemy's country; upon which it depends for its supplies, reinforcements, etc.; to which it sends back its sick and wounded; and upon which it would generally fall back in case of reverse and retreat.

Baseball, a game played with a bat and ball which has obtained a decidedly national character in the United States. It is a development of the New England town-ball and of the earlier schoolboy game of 'One Old Cat.' In its present essential form it is supposed to have been devised by Abner Doubleday at Cooperstown, N. Y., in 1839. It was first played by organized baseball clubs in New York in 1843, and spread rapidly in favor both as an amateur and professional game. Professional baseball is systematically organized into leagues of various classes under the control of a central body known as the National Commission. Professional players are also organized into a protective fraternity, which was founded in 1913. The winning teams of the two major leagues (the National League, organized in 1876, and the American League, organized in 1900), contest annually for the 'World's championship.' The game is played by two teams of nine players each, on a field containing a 'diamond' which is square in shape, each side of the square being 90 feet long. One corner of the diamond is known as the home plate; second base is located at the opposite corner; looking toward second base from the home plate, the base at the right is first base, and that at the left third base. The home plate is located near one corner of the field, and the 'base lines' running from the home plate to first and third bases are continued to the extremities of the field to mark the 'foul lines.' The teams field and bat alternately, the names and positions of the players on the field being 'catcher,' who stands immediately behind the home plate; 'pitcher,' who stands 60 feet 6 inches from the home plate on a line from the latter to second base; first, second and third basemen, who are located at the respective bases, 'short stop,' who is stationed between the second and third bases, and three 'outfielders' (left, center and right), who stand between the foul lines outside of the diamond. The players of the opposing team bat in turn, standing at the home plate and endeavoring to hit the ball, which is thrown by the pitcher, into fair territory but out of the reach of the fielders. By an elaborate system of rules the batters may advance from base to base unless retired in one of several ways by the team in the field. The team continues to bat until three of its players are retired. Each complete circuit of the bases counts a 'run,' the team scoring the greater number of runs winning the game. Ordinarily a game consists of nine 'innings,' an inning including a turn at bat for each team. Scientific pitching of the ball to the batter is of vital importance. Good pitchers have the ability to make a pitched ball curve in various deceptive ways, which, coupled with a puzzling change of speed in pitching the ball, greatly increases the difficulties of the batter.

Basedow (bä′ze-dō), JOHN BERNHARD, German educationalist, born 1723; died 1790. Under the auspices of the Prince of Anhalt-Dessau he opened, in 1774, an educational institution which he called the *Philanthropin*, a school free from sectarian bias, and in which the pupils were to be disciplined in all studies—physical, intellectual, and moral. This school led to the establishment of many similar ones, though Basedow retired from it in 1778. The chief feature of Basedow's system is the full development of the faculties of the young at which he aspired, in pursuance of the notions of Locke and Rousseau.

Basel (bä′zl); Fr. *Bâle*), a canton and city of Switzerland. The canton borders on Alsace and Baden, has an area of 176 sq. miles and a pop. of 180,000, nearly all speaking German. It is divided into two half-cantons, Basel city (Basel-stadt) and Basel country (Basel-Landschaft). The former consists of the city and its precincts, the remainder of the canton forming Basel-Landschaft, the capital of which is Liestal. The city of Basel is 43 m. N. of Bern, and consists of two parts on opposite sides of the Rhine, and communicating by three bridges, one of them an ancient wooden structure; in the older portions is irregularly built with narrow streets; has an ancient cathedral, founded 1010, containing the tombs of Erasmus and other eminent persons; a university, founded in 1459; a seminary for missionaries; a museum containing the valuable public library, pictures, etc. The industries embrace silk ribbons (8000 hands employed), tanning, paper, aniline dyes, brewing, etc.; and the advantageous position of Basel, a little below where the Rhine becomes navigable and at the terminus of the French and German railways, has made it the emporium of a most important trade. At Basel was signed the treaty of peace between France and Prussia, April 5, and that between France and Spain, July 22, 1795. Pop. 129,470.



Basel, from above the Town.

Basel, COUNCIL OF, a great non-œcumenical council of the church convoked by Pope Martin V and his successor Eugenius IV. It was opened 14th Dec., 1431, under the presidency of the Cardinal Legate Juliano Cesarini of St. Angelo. The objects of its deliberations were to extirpate heresies (that of the Hussites in particular), to unite all Christian nations under the Catholic Church, to put a stop to wars between Christian princes, and to reform the church. But its first steps towards an absolute assertion of conciliar supremacy were displeasing to the pope, who authorized the cardinal legate to dissolve the council. That body opposed the pretensions of the pope, and, notwithstanding his repeated orders to remove to Italy, continued its deliberations under the protection of the emperor Sigismund, of the German princes, and of France. On the pope continuing to issue bulls for its dissolution the council commenced a formal process against him, and cited him to ap-

pear at its bar. On his refusal to comply with this demand the council declared him guilty of contumacy, and, after Eugenius had opened a counter-synod at Ferrara, decreed his suspension from the papal chair (Jan. 24, 1438). The removal of Eugenius, however, seemed so impracticable, that some prelates, who till then had been the boldest and most influential speakers in the council, including the Cardinal Legate Juliano, left Basel, and went over to the party of Eugenius. The Archbishop of Arles, Cardinal Louis Allemand, was now made first president of the council, and directed its proceedings with much vigor. In May, 1439. it declared Eugenius, on account of his disobedience of its decrees, a heretic, and formally deposed him. Excommunicated by Eugenius, they proceeded, in a regular conclave, to elect the duke Amadeus of Savoy to the papal chair. Felix V—the name he adopted—was acknowledged by only a few princes, cities, and universities. After this the moral power of the council declined; its last formal session was held May 16, 1443, though it was not technically dissolved till May 7, 1449, when it gave in its adhesion to Nicholas V, the successor of Eugenius. The decrees of the Council of Basel are admitted into none of the Roman collections, and are considered of no authority by the Roman lawyers. They were regarded, however, as of authority in points of canon law in France and Germany, as their regulations for the reformation of the church were soon adopted in the pragmatic sanctions of both countries, and, as far as they regarded clerical discipline, were enforced.

Base-level, the lowest level to which a stream is capable of eroding the land, any deeper erosion being prevented by the height of its point of discharge. A base-level plain is produced when its slopes are very gentle and the eroding power of rains and streams has practically ceased.

Base-line, in surveying, a straight line measured with the utmost precision to form the starting-point of the triangulation of a country or district. See also *Base.*

Ba'shan, the name in Scripture for a singularly rich tract of country lying beyond the Jordan between Mount Hermon and the land of Gilead. At the time of the Exodus it was inhabited by Amorites, who were overpowered by the Israelites, and the land assigned to the half-tribe of Manasseh. The district was, and yet is, famous for its oak forests and its cattle. Remains of ancient cities are common.

Bashi (bä-shē') or BATA'NES ISLANDS, a group of islands in the Chinese Sea between Luzon and Formosa, lon. 122° E.; lat. 20° 28′ to 20° 55′ N. They were discovered by the Dampier in 1687, and form a section of the Philippine group. The largest island is Batan, with a population of 12,000.

Bashi-Bazouks (bash'i-ba-zökz), irregular troops in the Turkish army. They are mostly Asiatics, and have had to be disarmed several times by the regular troops on account of the barbarities by which they have rendered themselves infamous.

Bashkirs (bash'kirs), a tribe of Finnish or of Tartar origin, inhabiting the Russian governments of Ufa, Orenburg, Perm, and Samara. They formerly roamed about under their own princes in Southern Siberia, but in 1556 they voluntarily placed themselves under the Russian scepter. They are nominally Mohammedans, and live by hunting, cattle-rearing, and keeping of bees. They are rude and war-like and partially nomadic. They number about 750,000.

Bashkirtseff (bäsh-kērt'sev), MARIA CONSTANTINOVA (MARIE), Russian artist and writer, born 1860, of noble parentage. It is recorded of her that she could read Plato and Virgil in the original and write four languages with equal facility. She was accomplished as a musician, and trained for a singer, but losing her voice devoted herself to art. She worked in a studio in Paris and from 1880 to 1884 exhibited in the Salon, where she received a *mention honorable.* Her health gave way under her labors and the stress of fashionable life, and she died of consumption in 1884. She is perhaps most widely known through her *Journal,* parts of which appeared in 1887.

Basil, a labiate plant. *Ocymum basilĭcum,* a native of India, much used in cookery, especially in France, and known more particularly as sweet or common basil. Bush or lesser basil is *O. minimum;* wild basil belongs to a different genus, *Calamintha clinopodium.*

Basil, ST., called the *Great,* one of the Greek fathers, was born in 329, and made in 370 bishop of Cæsarea in Cappadocia, where he died in 379. He was distinguished by his efforts for the regulation of clerical discipline, and above all, his endeavors for the promotion of monastic life. The Greek Church honors him as one of its most illustrious saints, and celebrates his festival January 1. The vows of obedience, chastity, and poverty framed by St. Basil are essentially the rules of all the orders of Christendom, although he is particularly the father of the eastern, as St.

Benedict is the patriarch of the western orders.

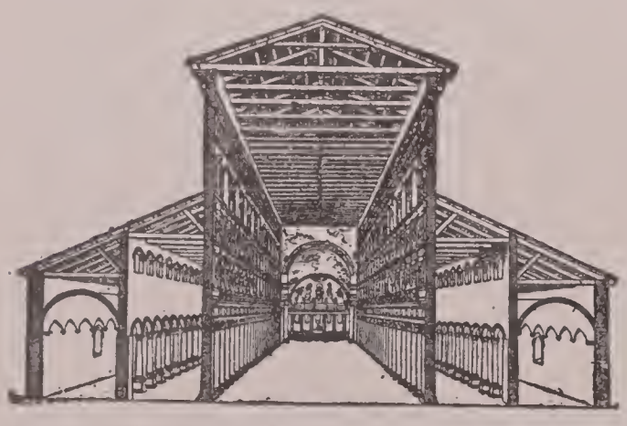
Basilan (bá-sē-lán'), the principal island of the Sulu Archipelago, now belonging to the Philippines, off the S.W. extremity of Mindanao, from which it is separated by the Strait of Basilan. It is about 42 m. in length by 6 average breadth. Pop. about 27,000.

Basilean (bas-i-le'an) MANUSCRIPTS, two manuscripts of the Greek New Testament now in the library of Basel. (1) A nearly complete uncial copy of the Gospels of the eighth century; (2) a cursive copy of the whole New Testament except the Apocalypse, tenth century.

Basilian (ba-sil'i-an) LITURGY, that form for celebrating the Eucharist drawn up towards the close of the fourth century by Basil the Great, still used in the Greek Church.

Basilian Monks, monks who strictly follow the rules of St. Basil, chiefly belonging to the Greek Church.

Basilica (ba-sil'i-ka), originally the name applied by the Romans to their public halls, either of justice, of exchange, or other business. The plan of the basilica was usually a rectangle divided into aisles by rows of columns, the middle aisle being the widest, with a semicircular apse at the end,



Basilica of St. Peter, Rome.

in which the tribunal was placed. The ground-plan of these buildings was generally followed in the early Christian churches, which, therefore, long retained the name of basilica, and it is still applied to some of the churches in Rome by way of distinction, and sometimes to other churches built in imitation of the Roman basilicas.

Basilicata (ba-sil-i-ka'tá), also called POTENZA, an Italian province, extending north from the Gulf of Taranto, and corresponding pretty closely with the ancient Lucania. Area 3845 sq. m.; pop. 491,558.

Basilicon (ba-sil'i-kon), a name of several ointments, the chief ingredients of which are wax, pitch, resin, and olive-oil.

Basil'icon Do'ron (the royal gift), the title of a book written by King James I in 1599, containing a collection of precepts of the art of government. It maintains the claim of the king to be sole head of the church. Printed at Edinburgh, 1603.

Basilides (ba-sil'i-dēz), an Alexandrian Gnostic who lived under the reigns of Trajan, Adrian, and Antoninus, but the place of whose birth is unknown. He was well acquainted with Christianity, but mixed it up with the wildest dreams of the Gnostics, peopling the earth and the air with multitudes of *æons*. His disciples (Basilidians) were numerous in Syria, Egypt, Italy, and Gaul, but they are scarcely heard of after the fourth century.

Basilisk (bas'i-lisk), a fabulous creature formerly believed to exist, and variously regarded as a kind of serpent, lizard, or dragon, and sometimes identified with the cockatrice. It inhabited the deserts of Africa, and its breath and even its look was fatal. The name is now applied to a genus of saurian reptiles (*Basiliscus*), belonging to the family Iguanidæ, distinguished by an elevated crest or row of scales, erectible at pleasure, which, like the dorsal fins of some fishes, runs along the whole length of the back and tail. The mitred or hooded basilisk (*B. mitrātus*) is especially remarkable for a membranous bag at the back of the head, of the size of a small hen's egg, which can be inflated with air at pleasure. The other species have such hoods also, but of a less size. To this organ they owe their name, which recalls the basilisk of fable, though in reality they are exceedingly harmless and lively creatures. The species of *Basiliscus* are peculiar to America, chiefly inhabiting Central America and Mexico.

Basilius I (ba-sil'i-us), Emperor of the East, born in Macedonia about 820; died in 886. He was of obscure origin, but having succeeded in gaining the favor of the Emperor Michael III, he became his colleague in the empire, 866. After the assassination of Michael in 867, Basilius became emperor. Though he had worked his way to the throne by a series of crimes, he proved an able and equitable sovereign. He drove the Saracens out of Italy in 885 and began the collection of laws called the *Constitutiones Basilicæ*, which was completed by his son Leo.

Basilius II, Emperor of the East, born 958, died 1025. On the death of his father, the Emperor Romanus the Younger, in 963, he was kept out of the succession for twelve years by two usurpers. He began to reign in conjunction with his brother Constantine 975. His reign was almost a continued scene of warfare, his most important struggle being that which resulted in the conquest of Bulgaria, 1018.

Basin (bā'sin), in physical geography, the whole tract of country drained by a river and its tributaries. The line dividing one river basin from another is the watershed, and by tracing the various watersheds we divide each country into its constituent basins. The basin of a loch or sea consists of the basins of all the rivers which run into it.—In geology a basin is any dipping or disposition of strata towards a common axis or center, due to upheaval and subsidence. It is sometimes used almost synonymously with 'formation' to express the deposits lying in a certain cavity or depression in older rocks. The 'Paris basin' and 'London basin' are familiar instances.

Basingstoke (bā'sing-stōk), a town of England, county of Hants, 18 miles N. N. E. from Winchester. It has a good trade in corn, malt, etc., and now gives name to one of the parl. divisions of the county. Pop. 11,540.

Baskerville (bas'ker-vil), JOHN, a celebrated English printer and type-founder, born in 1706; died 1775. He settled at Birmingham as a writing-master, subsequently engaged in the manufacture of japanned works, and in 1750 became a printer. From his press came highly-prized editions of ancient and modern classics, Bibles, prayer-books, etc., all beautifully-printed works.

Basket (bas'ket), a vessel or utensil of wickerwork, made of interwoven osiers or willows, rushes, twigs, grasses, etc. The process of basket-making is very simple, and appears to be well known among the very rudest peoples. The ancient Britons excelled in the art, and their baskets were highly prized in Rome.

Basketball, an American game invented in 1891 by James Naismith. It is mostly played indoors between the close of the football and the opening of the baseball season. First played by the Young Men's Christian Association it was rapidly adopted by athletic organizations, schools and colleges, where it is popular with both sexes, with some modifications of the rules for women. Under the present rules the game is played on a floor 50 by 70 feet. The goals are hammock nets of cord, suspended from metal rings 18 inches in diameter, and placed 10 feet from the ground, in the center of the ends of the playing space. The game is played by five on a side, with a round ball 30 to 32 inches in circumference. Time of play is divided into 20-minute halves with a rest of 10 minutes between halves. A goal is made by batting or throwing the ball into the basket of the opposing side and counts 2 points. Goals from fouls (made by the side gaining the ball on a foul committed by the opposing side) count 1 point. The side having the greatest number of points at the close of play wins the game.

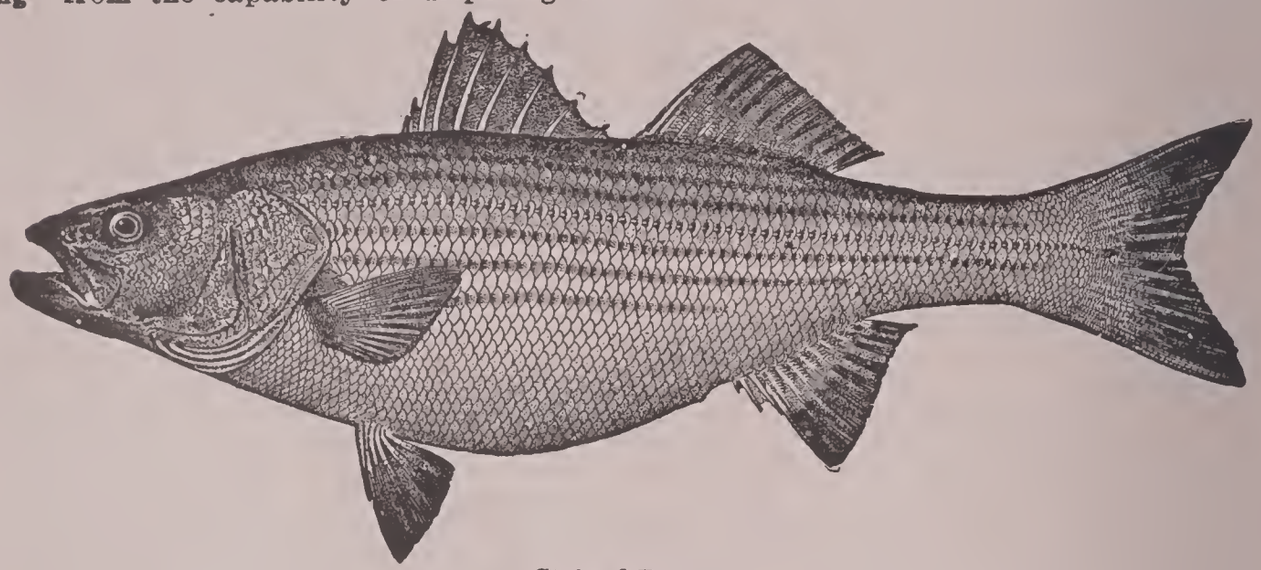
Basking-shark (*Selăchē maxima* or *Cetorhīnus maximus*), a species of shark, so named from its habit of basking in the sun at the surface of the water. It reaches the length of 40 feet, and its liver yields a large quantity of oil. It frequents the northern seas, and is known also as the sail-fish or sun-fish.

Basques (bāsks), or BISCAYANS (in their own language, *Eskualdunak*), a remarkable race of people dwelling partly in the southwest corner of France, but mostly in the north of Spain adjacent to the Pryenees. They are probably descendants of the ancient Iberi, who occupied Spain before the Celts. They preserve their ancient language, former manners, and national dances, and make admirable soldiers, especially in guerrilla warfare. Their language is highly polysynthetic, and no connection between it and any other language has as yet been made out. There are four principal dialects, which are not only distinguished by their pronunciation and grammatical structure, but differ even in their vocabularies. The Basques, who number about 600,000, occupy in Spain the provinces of Biscay, Guipuzcoa, and Alăva; in France the arrondissement of Bayonne and Mauléon.

Bas-relief (bä'rē-lēf or bas'rē-lēf), BASS-RELIEF, low relief, a

Bas-relief, from the Elgin Marbles.

mode of sculpturing figures on a flat surface, the figures having a very slight relief or projection from the surface. It is distinguished from *haut-relief* (*alto-rilievo*), or high relief, in which the figures stand sometimes almost entirely free from the ground. Bas-relief work has been described as 'sculptured painting' from the capability of disposing of groups of figures and exhibiting minor adjuncts, as in a painting.



Striped Bass.

Bass (bās; from the Italian *basso*, deep, low), in music, the lowest part in the harmony of a musical composition, whether vocal or instrumental. According to some it is the fundamental or most important part, while others regard the melody or highest part in that light. Next to the melody, the bass part is the most striking, the freest and boldest in its movements, and richest in effect.—*Figured bass*, a bass part having the accompanying chords suggested by certain figures written above or below the notes—the most successful system of short-hand scoring at present in use among organists and pianists.—*Fundamental bass*, the lowest note or root of a chord; a bass consisting of a succession of fundamental notes.—*Thorough bass*, the mode or art of expressing chords by means of figures placed over or under a given bass. Figures written over each other indicate that the notes they represent are to be sounded simultaneously, those standing close after each other that they are to be sounded successively. The common chord in its fundamental form is generally left unfigured, and accidentals are indicated by using sharps, naturals, or flats along with the figures.

Bass (bās), the name of a number of fishes of several genera, but originally belonging to a genus of sea-fishes (*Labrax*) of the perch family, distinguished from the true perches. *L. lupus*, the only British species, called also sea-dace, and from its voracity sea-wolf, migrates in shoals from June onwards, and often ascends rivers; it resembles somewhat the salmon in shape, and is much esteemed for the table, weighing about 15 lbs. *L. lineātus* (*Roccus lineātus*), or striped bass, an American species, weighing from 25 to 30 lbs., is much used for food, and is also known as rock-fish. Both species occasionally ascend rivers, and attempts have been made to cultivate British bass in fresh-water ponds with success. Two species of black bass (*Micropterus salmoides* and *M. dolomieu*), American fresh-water fishes, are excellent as food and give fine sport to the angler. The former is often called the large-mouthed black bass, from the size of its mouth. Both make nests and take great care of their eggs and young. The *Centropristis striatus*, an American sea-fish of the perch family, and weighing 2 to 3 lbs., is known as the sea-bass.

Bass (bās), The, a remarkable insular trap-rock of Scotland at the mouth of the Firth of Forth, 3 miles from North Berwick, of a circular form, about 1 mile in circumference, rising majestically out of the sea to a height of 313 feet. It pastures a few sheep, and is a great breeding-place of solan-geese. During the persecution of the Covenanters, its castle, long since demolished, was used as a state prison, in which several eminent Covenanters were confined. It was held from 1691 to 1694 with great courage and pertinacity by twenty Jacobites, who in the end capitulated on highly honorable terms.

Bass. See *Basswood.*

Bass, Robert Perkins, forest commissioner and legislator, born at

Chicago, Sept. 1, 1873, was graduated at Harvard Law School in 1898. He engaged in farming and real estate business in New Hampshire, devoting much of his time to the advancement of forestry in that state; was elected to the N. H. House in 1905 and to the Senate in 1909, and was forest commissioner of the state 1906–10. He was an earnest and successful advocate of reform, opposing energetically the railroad domination of the state, and in 1910 was elected governor on a reform ticket.—His brother JOHN FOSTER BASS (born 1866), has been a war correspondent: in Egypt in 1895; in Armenia at time of massacre, 1897; in the Greek war, 1898; in the Spanish-American war, the Phillippine insurrection, the Boxer outbreak in China, and the Russo-Japanese war, 1904.

Bassano (bȧs-sȧ′nō), a commercial city of North Italy, province of Vicenza, on the Brenta, over which is a covered wooden bridge. It has lofty old walls and an old castle, and has various industries and an active trade. Near Bassano, September 8, 1796, Bonaparte defeated the Austrian general Wurmser. Pop. 7896.

Bassano (from his birthplace; real name JACOPO DA PONTE), an Italian painter, born 1510; died 1592. He painted historical pieces, landscapes, flowers, etc., and also portraits; and left four sons, who all became painters, Francesco being the most distinguished.

Bassaris (bas′sa-ris) a genus of N. American carnivora representing the civets of the old world.

Bassein (bȧs-sān′), a town in Lower Burmah, province of Pegu, on both banks of the Bassein River, one of the mouths of the Irrawaddy, and navigable for the largest ships. It has considerable trade, exporting large quantities of rice, and importing coal, salt, cottons, etc. Pop. 30,000.—Bassein District has an area of 4127 sq. m. and a pop. of 383,102.

Bassein (bȧs-sān′), a decayed town in Hindustan, 28 miles north from Bombay. At the beginning of the 18th century it was a well-built and wealthy city, with over 60,000 inhabitants; it has now about 11,000.

Basselin (bȧs-lan), OLIVIER, an old French poet or song-writer, born in the Val-de-Vire, Normandy, about the middle of the 14th century; he died in 1418 or 1419. His sprightly songs have given origin and name to the modern Vaudevilles.

Basselisse (bas-lis) TAPESTRY, a kind of tapestry wrought with a horizontal warp. See *Hautelisse.*

Basses-Alpes (bäs-ȧlp; 'Lower Alps'), a department of France, on the Italian border. See *Alpes.*

Basses-Pyrénées (bäs-pē-rā-nā; 'Lower Pyrenees'), a French department, bordering on Spain and the Bay of Biscay. See *Pyrénées.*

Bass′et, the name of a game at cards, formerly much played, especially in France. It is very similar to the modern *faro.*

Basseterre (bäs-tār), two towns in the West Indies.—1. Capital of the island of St. Christopher's, at the mouth of a small river, on the south side of the island. Trade considerable. Pop. about 9000.—2. The capital of the island of Guadaloupe. It has no harbor, and the anchorage is unsheltered and exposed to a constant swell. Pop. about 8000.

Basset-horn (bas′set), a musical instrument, now practically obsolete, a sort of clarinet of enlarged dimensions, with a curved and bell-shaped metal end. The compass extends from F below the bass-staff to C on the second ledger-line above the treble. Mozart has several pieces written for the basset-horn.

Bassia (bas′i-a), a genus of tropical trees found in the East Indies and Africa, nat. order Sapotaceæ. One species (*B. Parkii*) is supposed to be the shea-tree of Park, the fruit of which yields a kind of butter that is highly valued, and forms an important article of commerce in the interior of Africa. There are several other species, of which *B. longifolia*, or Indian oil-tree, and *B. butyrăcĕa*, or Indian butter-tree, are well-known examples, yielding a large quantity of oleaginous or butyraceous matter. The wood is as hard and incorruptible as teak.

Bassompierre (bä-soŋ-pyār), FRANÇOIS DE, Marshal of France, distinguished both as a soldier and a statesman; born 1579, died 1646. In 1602 he made his first campaign against the Duke of Savoy, and he fought with equal distinction in the following year in the imperial army against the Turks. In 1622 Louis XIII appointed him Marshal of France, and became so much attached to him that Luynes, the declared favorite, sent him on embassies to Spain, Switzerland, and England. After his return he became an object of suspicion to Cardinal Richelieu, and was sent to the Bastille in 1631, from which he was not released till 1643, after the death of the cardinal. During

his detention he occupied himself with writing his memoirs, which shed much light on the events of that time.

Bassoon (ba-sön'), a musical wind-instrument of the reed order, blown with a bent metal mouthpiece, and holed and keyed like the clarinet. Its compass comprehends three octaves, rising from B flat below the bass-staff. Its diameter at bottom is 2 inches, and for convenience of carriage it is divided into two or more parts, whence its Italian name *fagotto*, a bundle. It serves for the bass among wood wind-instruments, as hautboys, flutes, etc.

Bassoon

Bassora (bas'o-ra) or BASRA, a seaport of Mesopotamia, on the west bank of the Shat-el-Arab (the united streams of the Tigris and Euphrates), about 50 miles from its mouth and nearly 300 southeast of Bagdad. The streets are narrow and unpaved. There are many gardens and palm groves, intersected by little canals navigated by small boats at high tide, which rises to a height of 9 ft. The houses are generally mean. A considerable transit trade is carried on here between the Turkish and Persian dominions and India, and since communication by steamer has been established with Bagdad and Bombay the prosperity of the town has greatly increased. The chief exports are dates, camels and horses, wool and wheat; imports coffee, indigo, rice, tissues, etc. Thirty years ago the inhabitants were estimated at 5000; they are now about 40,000; in the middle of last century they were said to number 150,000. The recent substitution of date and wheat cultivation for that of rice has rendered the place much more healthy. The ruins of the ancient and more famous Bassora—founded by Caliph Omar in 636, at one time a center of Arabic literature and learning and regarded as 'the Athens of the East'—lie about 9 miles southwest of the modern town.

Bassora Gum, an inferior kind of gum resembling gum-arabic.

Basso-rilievo. See *Bas-relief.*

Bass Rock. See *Bass.*

Bass Strait, a channel beset with islands, which separates Australia from Tasmania, 120 miles broad, discovered by George Bass, a surgeon in the royal navy, in 1798.

Basswood, BASS, the American lime-tree or linden (*Tilia Americāna*), a tree common in N. America, yielding a light, soft timber.

Bast, the inner bark of exogenous trees, especially of the lime or linden, consisting of several layers of fibers. The manufacture of bast into mats, ropes, shoes, etc., is in some districts of Russia a considerable branch of industry, bast mats, used for packing furniture, covering plants in gardens, etc., being exported in large quantities. Though the term is usually restricted, many of the most important fibers of commerce, such as hemp, flax, jute, etc., are the products of bast or liber.

Bastar (bas-tär'), a feudatory state in Upper Godavari district, Central Provinces of India; area, 13,062 sq. m.; pop. (1901) 306,501. Chief town, Jagdalpur.

Bas'tard, a child begotten and born out of wedlock; an illegitimate child. By the civil and canon laws and by the law of Scotland (as well as of some of the United States), a bastard becomes legitimate by the intermarriage of the parents at any future time. But by the laws of England a child, to be legitimate, must at least be *born* after the lawful marriage; it does not require that the child shall be begotten in wedlock, but it is indispensable that it should be born after marriage, no matter how short the time, the law presuming it to be the child of the husband. The only incapacity of a bastard is that he cannot be heir or next of kin to any one save his own issue.

Bastard Bar, more correctly *baton sinister*, the heraldic mark used to indicate illegitimate descent. It is a diminutive of the bend sinister, of which it is one-fourth in width, couped or cut short at the ends, so as not to touch the corners of the shield.

Bastard Bar.

Bastard Cedar. See *Cedrela.*

Bastard Saffron. See *Cedrela.*

Bastia (bäs-tē'ä), the former capital of the island of Corsica, upon the N. E. coast, 75 miles N. E. of Ajaccio, on a hill slope; badly built, with narrow streets, a strong citadel, and an indifferent harbor; but has some manufactures, a considerable trade in hides, soap, wine, oil, pulse, etc. Pop. (1906) 24,569.

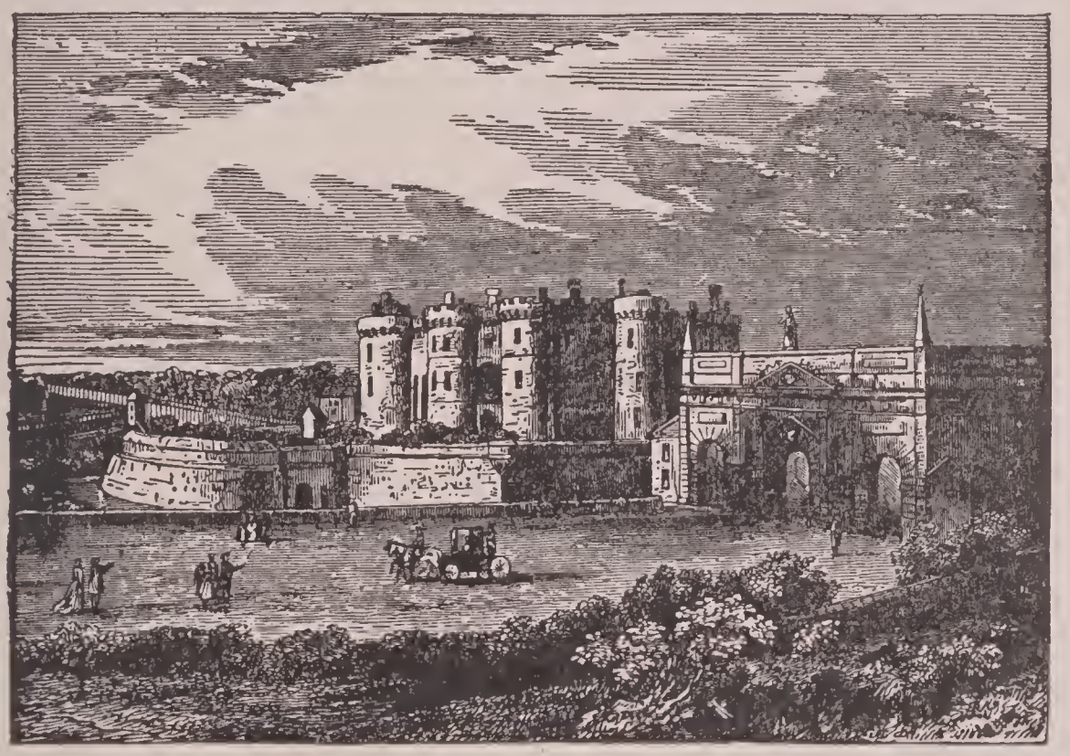
Bastian (bast'yan), ADOLF, a German traveler and ethnologist; born in 1826. He traveled very widely and his numerous writings throw light on almost every subject connected with ethnology or anthropology, as well as psychology, linguistics, non-Christian religions, geography, etc. One of his chief works is *Die Völker des östlichen Asien* ('Peoples of Eastern Asia,' 6 vols., 1866–71). Died 1905.

Bastian (bas'ti-an), HENRY CHARLTON, an English physician and biologist, born at Truro in 1837. He was educated at Falmouth and at University College, London, where he was assistant curator in the museum in 1860-63. He subsequently studied medicine and in 1867 became professor of pathological anatomy in University College. Apart from numerous contributions to medical and other periodicals, and to Quain's *Dictionary of Medicine*, he wrote *The Modes of Origin of Lowest Organisms; The Beginnings of Life; Evolution and the Origin of Life; Lectures on Paralysis from Brain Disease;* and *The Brain as an Organ of Mind.* He became an ardent advocate for spontaneous generation. Died Nov. 18, 1915.

Bastiat (bå-tē-ä), FRÉDÉRIC, a French economist and advocate of free trade, born at Bayonne 1801; died at Rome 1850. He became acquainted with Cobden and the English free traders, whose speeches he translated into French. His chief works are: *Sophismes Econimiques, Propriété et Loi, Justice et Fraternité, Protectionisme et Communisme, Harmonies Economiques,* etc.

Bastien-Lepage, JULES, a notable painter, born at Damvillers, France, in 1848; died in 1884; a pupil of Alexander Cabanel; best known by his *La Première Communion, Jeanne d'Arc* (in the Metropolitan Museum, New York), portraits of Sara Bernhardt, André Theuriet, etc.

Bastille (bås-tēl'), a French name for any strong castle provided with towers, but as a proper name the state prison and citadel of Paris, which was built about 1370 by Charles V. It was ultimately used chiefly for the confinement of persons of rank who had fallen victims to the intrigues of the court or the caprice of the government. (See *Cachet, Lettres de.*) The capture of the Bastille by the Parisian mob, 14th July, 1789, was the opening act of the revolution. On that date the Bastille was surrounded by a tumultuous mob, who first attempted to negotiate with the governor Delaunay, but when these negotiations failed, began to attack the fortress. For several hours the mob continued their siege without being able to effect anything more than an entrance into the outer court of the Bastille; but at last the arrival of some of the Royal Guard with a few pieces of artillery



The Bastille, as in time of Louis XV.

forced the governor to let down the second drawbridge and admit the populace. The governor was seized, but on the way to the hôtel de ville he was torn from his captors and put to death. The next day the destruction of the Bastille commenced. Not a vestige of it exists, but its site is marked by a column in the Place de la Bastille.

Bastinado (bas-ti-nā′dō), an eastern method of corporal punishment, consisting of blows upon the soles of the feet, applied with a stick.

Bastion (bast′yun), in fortification, a large mass of earth, faced with sods, brick, or stones, standing out from a rampart, of which it is a principal part. A bastion consists of two flanks, each commanding and defending the adjacent *curtain*, or that portion of the wall extending from one bastion to another, and two *faces* making with each other an acute angle called the *salient angle*, and commanding the outworks and ground before the fortification. The distance between the two flanks is the *gorge*, or entrance into the bastion. The use of the bastion is to bring every point at the foot of the rampart as much as possible under the guns of the place.

Bastwick (bast′wik), JOHN, an English physician and ecclesiastical controversialist, born in 1593, died 1654. He settled at Colchester, but instead of confining himself to his profession, entered keenly into theological controversy, and was condemned by the Star Chamber for his books against Prelacy: *Elenchus Religionis Papisticæ*, *Flagellum Pontificis*, and *The Letanie of Dr J. Bastwick*. With Prynne and Burton he was sentenced to lose his ears in the pillory, to pay a fine of $25,000, and to be imprisoned for life. He was released by the Long Parliament, and entered London in triumph along with Prynne and Burton. He appears to have continued his controversies to the very last with the Independents and others.

Basutoland (ba-sö′tō-land), a division of British South Africa, enclosed between Orange River Colony, Natal, Griqualand East, and Cape Colony. The Basutos belong chiefly to the great stem of the Bechuanas, and have made greater advances in civilization than perhaps any other South African race. In 1868 the Basutos, who had lived under a semi-protectorate of the British since 1848, were proclaimed British subjects, their country placed under the government of an agent, and in 1871 it was joined to Cape Colony. In 1880 the attempted enforcement of an act passed for the disarmament of the native tribes was the cause of repeated revolts, which the Cape forces were unable to put down. When peace was restored Basutoland was disannexed from Cape Colony (1884), and is now a crown colony of Great Britain. Basutoland has an area of about 10,300 sq. miles, much of it covered with grass, and there is but little wood. The climate is pleasant. The natives keep cattle, sheep, and horses, cultivate the ground, and export grain. It is divided into seven districts, each presided over by a magistrate. Pop. (1904) 348,848, few of them Europeans.

Bat, one of the group of wing-handed, flying mammals, having the forelimb peculiarly modified so as to serve for flight, and constituting the order *Chiroptera*. Bats are animals of the

Great Horseshoe Bat (*Rhinolŏphus Ferrum equinum*).

twilight and darkness, and are common in temperate and warm regions, but are most numerous and largest in the tropics. All European bats are small, and have a mouse-like skin. Many bats are remarkable for having a singular

Skeleton and Outline of Bat (*Phyllostoma hastatum*).

nasal cutaneous appendage, bearing in some cases a fancied resemblance to a horse-shoe. Bats may be conveniently divided into two sections—the insectivorous or carnivorous, comprising all

European and most African and American species; and the fruit-eating, belonging to tropical Asia and Australia, with several African forms. An Australian fruit-eating bat (*Pterŏpus edūlis*), commonly known as the kalong or flying-fox, is the largest of all the bats; it does much mischief in orchards. At least two species of South American bats are known to suck the blood of other mammals, and thence are called 'vampire-bats' (though this name has also been given to a species not guilty of this habit). The best known is the *Desmŏdus rufus* of Brazil, Chile, etc. As winter approaches, in cold climates bats seek shelter in caverns, vaults, ruinous and deserted buildings, and similar retreats, where they cling together in large clusters, hanging head downwards by the feet, and remain in a torpid condition until the returning spring recalls them to active exertions. Bats bring forth one and sometimes two young, which, while suckling, remain closely attached to the mother's teats, which are two, situated upon the chest. The parent shows a strong degree of attachment for her offspring, and, when they are captured, will follow them, and even submit to captivity herself rather than forsake her charge.

Batalha (bȧ-tȧl'yȧ), a village in Portugal, 69 miles north of Lisbon, with a renowned convent of Dominicans, a splendid building.

Batangas (bȧ-tȧn'gȧs), a town of the Philippines, in the island Luzon, capital of a province of same name, 58 miles S. of Manila. Pop. 33,131.

Bata'tas. See *Sweet Potato.*

Bat'avi. See *Batavians.*

Batavia (ba-tā'vi-a), a city and seaport of Java, on the north coast of the island, the capital of all the Dutch East Indies. It is situated on a wide, deep bay, the principal warehouses and offices of the Europeans, the Java Bank, the exchange, etc., being in the old town, which is built on a low, marshy plain near the sea, intersected with canals and very unhealthy; while the Europeans reside in a new and much healthier quarter. Batavia has a large trade, sugar being the chief export. It was founded by the Dutch in 1619, and attained its greatest prosperity in the beginning of the eighteenth century. Here is one of the most magnificent botanical gardens of the world. Its inhabitants are chiefly Malay, with a considerable admixture of Chinese and a small number of Europeans. Pop. (1918) 234,697.

Batavia, a city, county seat of Genesee Co., New York, 36 miles N. E. of Buffalo by rail. It has large manufactories of harvesting machinery and plows, also shotguns, shoes, etc. It is the seat of the State institution for the blind. Pop. (1910) 11,613; (1920) 13,541.

Batavians, an old German nation which inhabited a part of the present Holland, especially the island called *Batavia*, formed by that branch of the Rhine which empties itself into the sea near Leyden, together with the Waal and the Maas. Tacitus asserts them to have been a branch of the Catti. They were subdued by Germanicus, and were granted special privileges for their faithful services to the Romans, but revolted under Vespasian. They were, however, again subjected by Trajan and Adrian, and at the end of the third century the Salian Franks obtained possession of the island of Batavia.

Batchian. See *Bachian.*

Bath (bȧth), a city of England, in Somersetshire, on the Avon, which is navigable for barges from Bristol. The Abbey Church ranks as one of the finest specimens of perpendicular Gothic architecture. Bath is remarkable for its medicinal waters, the four principal springs yielding no less than 184,000 gallons of water a day; and the baths are both handsome and commodious. The temperature of the springs varies from 109° to 117° Fahrenheit. They contain carbonic acid, chloride of sodium and of magnesium, sulphate of soda, carbonate and sulphate of lime, etc. Bath was founded by the Romans, and called by them *Aquæ Sulis*, from a British goddess. Amongst the Roman remains discovered here have been some fine baths. The height of its prosperity was reached, however, in the 18th century, when Beau Nash was leader of the fashion and master of its ceremonies. Since then, though it still attracts large numbers of visitors, it has become the resort of valetudinarians chiefly. Pop. (1918) 69,173.

Bath, a seaport city of Maine, on the west side and at the head of the winter navigation of the Kennebec, 12 miles from the sea. Chief industries: shipbuilding and allied crafts. It has a soldiers' and sailors' orphans' home. Pop. (1910) 9396; (1920) 14,731.

Bath, the immersion of the body in water or an apparatus for this purpose. The use of the bath as an

institution apart from occasional immersion in rivers or the sea is, as might be anticipated, an exceedingly old custom. Homer mentions the bath as one of the first refreshments offered to a guest; thus, when Ulysses enters the palace of Circe a bath is prepared for him, and he is anointed after it with costly perfumes. No representation, however, of a bath as we understand it is given upon the Greek vases, bathers being represented either simply washing at an elevated basin or having water poured over them from above. In later times, rooms, both public and private, were built expressly for bathing, the public baths of the Greeks being mostly connected with the gymnasia. Apparently, by an inversion of the later practice, it was customary in the Homeric epoch to take first a cold and then a hot bath; but the Lacedemonians substituted the hot-air sudorific bath, as less enervating than warm water, and in Athens at the time of Demosthenes and Socrates the warm bath was considered by the more rigorous as an effeminate custom. The fullest details we have with respect to the bathing of the ancients apply to its luxurious development under the Romans. Their bathing establishments consisted of four main sections: the undressing room, with an adjoining chamber in which the bathers were anointed; a cold room with provision for a cold bath; a room heated moderately to serve as a preparation for the highest and lowest temperatures; and the sweating-room, at one extremity of which was a vapor-bath and at the other an ordinary hot bath. After going through the entire course both the Greeks and Romans made use of strigils or scrapers, either of horn or metal, to remove perspiration, oil, and impurities from the skin. Connected with the bath were walks, covered race-grounds, tennis-courts, and gardens, the whole, both in the external and internal decorations, being frequently on a palatial scale. The group of the Laocoon and the Farnese Hercules were both found in the ruins of Roman baths. With respect to modern baths, that commonly in use in Russia consists of a single hall, built of wood, in the midst of which is a metal oven covered with heated stones, and surrounded with broad benches, on which the bathers take their places. Cold water is then poured upon the heated stones, and a thick, hot steam rises, which causes the sweat to issue from the whole body. The bather is then gently whipped with wet birch rods, rubbed with soap, and washed with lukewarm and cold water; of the latter, some pailfuls are poured over his head; or else he leaps, immediately after this sweating-bath, into a river or pond, or rolls in the snow. The Turks, by their religion, are obliged to make repeated ablutions daily, and for this purpose there is, in every city, a public bath connected with a mosque. A favorite bath among them, however, is a modification of the hot-air sudorific bath of the ancients introduced under the name of 'Turkish' into other than Mohammedan countries. A regular accompaniment of this bath, when properly given, is the operation known as 'kneading,' generally performed at the close of the sweating process, after the final rubbing of the bather with soap, and consisting in a systematic pressing and squeezing of the whole body, stretching the limbs, and manipulating all the joints as well as the fleshy and muscular parts. Public baths are now common in the United States. There are also numerous 'hot springs' in nearly every section. Among the most famous are those at Hot Springs, in Garland Co., Arkansas, resorted to by invalids for the cure of rheumatism and similar complaints. There are here from seventy-five to one hundred springs, varying in temperature from 105° to 160°, issuing from a lofty ridge of sandstone overlooking the town, while others rise in the bed of the stream near by.

The principal natural warm baths in England are at Bath and Bristol in Somersetshire, and Buxton and Matlock in Derbyshire. The baths of Harrogate, which are strongly impregnated with sulphuretted hydrogen gas, are also of great repute for the cure of obstinate cutaneous diseases, indurations of the glands, etc. The most celebrated natural hot baths in Europe are those of Aix-la-Chapelle, and the various Baden in Germany; Toeplitz, in Bohemia; Bagnières, Baréges, and Dax, in the south of France; and Spa, in Belgium. Besides the various kinds of water-bath with or without medication or natural mineral ingredients, there are also milk, oil, wine, earth, sand, mud, and electric baths, smoke-baths and gas-baths; but these are as a rule only indulged after specific prescription.

The use of the cold bath in clinical practice has taken a prominent place in the teaching of modern medicine, its chief hydrotherapeutic application being in the reduction of hyperpyrexia in the various forms of fever. It was first successfully introduced in Germany, and now its adoption is almost universal, being part

of the technique of nearly all hospital treatment.

The electrical bath is in common use, its distinctive feature being an electric current passed through the water used for bathing. Baths of compressed air, supposed to be possessed of some therapeutic value, were formerly employed, the patient being subjected to a pressure of two or three atmospheres. Vegetable baths in great variety have been frequently tried by persons seeking real or fancied remedial properties in their use. Lees of wine undergoing fermentation was one form of the vegetable bath; seaweed was another, being added to the water under the idea that the iodine it contained might be conveyed to the system. A distillation of pine leaves is one of the most popular adjuncts in the preparation of the vegetable bath. Animal substances used for baths, also employed for their supposed therapeutic action, have been varied and curious. Baths of milk have been mentioned, but it is authentically recorded that baths of blood and even human blood have been indulged in, doubtless during decadent social periods.

Heliotherapy, is the method of treating diseases by exposing the naked body to the sun's rays. It has been found particularly helpful for tuberculosis of the bones and joints, though it has been employed with success in other diseases also, including acute rheumatism and even certain affections of the eye. Coxalgia or white tumor of the knee is not only healed but the joint remains mobile, a result which is said to be lacking where surgery is resorted to. It has been proved to be efficacious in wounds, even when infected, and to hasten the formation of scar-skin in burns. It is claimed that results may be obtained wherever direct sunlight can be had, whether on mountain-top, seacoast, desert, or the roof of a city tenement.

Bath, KNIGHTS OF THE, an order of England, supposed to have been instituted by Henry IV on the day of his coronation, but allowed to lapse after the reign of Charles II till 1725, when George I revived it as a military order. By the book of statutes then prepared the number of knights was limited to the sovereign and thirty-seven knights companions; but the limits of the order were greatly extended in 1815, and again in 1847, when it was opened to civilians.

Bath-brick, a preparation of siliceous earth found in the river Parret in Somersetshire; manufactured into bricks at Bridgewater; used for cleaning knives, etc.

Bathgate (bath'gāt), a town of Scotland, County Linlithgow, having glass works, a distillery, and several grain-mills, and in the vicinity a paraffin works and coal and ironstone mines. Pop. (1911) 8226.

Bathing. See *Bath.*

Bathometer (bath-om'e-tėr), an instrument for measuring the depth of sea beneath a vessel without casting a line. It is based upon the fact that the attraction exerted upon any given mass of matter on the ship is less when she is afloat than ashore because of the smaller density of seawater as compared with that of earth or rock.

Bathori (bä'to-rē), a Hungarian family which gave Transylvania five princes and Poland one of its greatest kings. The more important members were:—1. STEPHEN, born in 1532, elected Prince of Transylvania in 1571, on the death of Zapolya, and in 1575 King of Poland. He accomplished many internal reforms, recovered the Polish territories in possession of the Czar of Muscovy, and reigned prosperously till his death in 1586.—2. SIGISMUND, nephew of Stephen, educated by the Jesuits, became waiwode or prince of Transylvania in 1581, shook off the Ottoman yoke and had begun to give hopes of reigning gloriously when he resigned his dominions to the emperor Rudolph II, in return for two principalities in Silesia, a cardinal's hat, and a pension. Availing himself, however, of an invitation by the Transylvanians, he returned, and placed himself under the protection of the Porte, but was defeated by the Imperialists in every battle, and finally sent to Prague, where he died almost forgotten in 1613.—3. ELIZABETH, niece of Stephen, King of Poland, and wife of Count Nadasdy, of Hungary. She is said to have bathed in the blood of several hundred young girls in the hope of renewing her youth, and to have committed other enormities. She was finally seized and confined till her death in 1614.

Bat-horse. See *Batman.*

Bathos (bā'thos), a Greek word meaning depth, now used to signify a ludicrous sinking from the elevated to the mean in writing or speech. First used in this sense by Pope.

Bath-stone, a species of English lime-stone, also called *Bath-oolite* and *roe-stone*, from the small rounded grains of which it is composed. It is extensively worked near Bath for building purposes.

Bathurst (bath'urst), a British settlement on the west coast of Africa, on the island of St. Mary's, near the mouth of the Gambia, with a trade in gum, bees'-wax, hides, ivory, gold, rice, cotton and palm-oil. Pop. about 9000, less than a hundred whites.

Bathurst, a town in the western district of New South Wales, on the Macquarie river, with tanneries, railway workshops, breweries, flour-mills, and other industries. The Bathurst gold-fields were discovered in 1851. Pop. 11,000.

Bathurst, county town of Gloucester, New Brunswick, a port of entry with large fisheries. Pop. (1911), 5428.

Bathurst, ALLEN BATHURST, EARL, a distinguished statesman in Queen Anne's reign; born 1684. He took part with Harley and St. John in opposing the influence of Marlborough, was raised to the peerage in 1711, impeached the promoters of the South Sea scheme, opposed the bill against Atterbury, and was a leading antagonist of Walpole. He was created earl in 1772. His name is also associated with those of the leading writers and wits of the day. Died 1775.

Bathurst, HENRY BATHURST, EARL, son of the second earl, a prominent Tory statesman, after whom various capes, islands, and districts were named. Born 1762; in 1807, president of Board of Trade; in 1809 secretary for foreign affairs; and in 1812, secretary for the colonies, a post held by him for sixteen years. He was also president of the council under Wellington, 1828–30. He died in 1834.

Bathurst Island, on the North Australian coast, belonging to South Australia, separated from Melville Island by a narrow strait; triangular in shape, with a wooded area of about 1000 sq. miles.—Also an island in the Arctic Ocean discovered by Parry, E. of Cornwallis and W. of Melville Island, 76° N., 100° W.

Bathyb'ius (Gr. *bathys*, deep, *bios*, life), the name given by Huxley to what he regarded as masses of a very low form of living organism, covering the sea-bottom at great depths, and in such abundance as to form in some places deposits of 30 feet or more in thickness. It has been described as a tenacious, viscid, slimy substance. As the result of investigations made by the 'Challenger' expedition it was established that it was an artificial product composed of gypsum precipitated by the action of alcohol on sea-water.

Bathymeter (ba-thim'e-tẽr), BATHYMETRY, the instrument for and the art of measuring the depth of the sea.

Batiste (ba-tēst'), a fine linen cloth made in Flanders and Picardy, named after its inventor Batiste of Cambray. The name is applied also to a fine cotton fabric.

Bat'ley, a borough of England, West Riding of York, about 2 miles from Dewsbury, has large mills for woolen cloth, carpets and shoddy. Pop. (1911) 36,395.

Batman (bat'man or bä'man; from F'r. *bât*, a pack-saddle), in the British army, a person allowed by the government to every company of a regiment on foreign service. His duty is to take charge of the cooking utensils, etc., of the company and he has a bat-horse to convey these utensils from place to place.

Baton (bat'on), a short staff or truncheon, in some cases used as an official badge, as that of a field-marshal. The conductor of an orchestra has a baton for the purpose of directing the performers as to time, etc. In heraldry, what is usually called the 'bastard bar,' or 'bar sinister,' is properly a baton sinister. See *Bastard Bar.*

Baton Rouge (rözh), the capital of Louisiana, on the left bank of the Mississippi 75 miles northwest of New Orleans, with an arsenal, barracks, military hospital, state-house, state university, etc. It has manufactures of lumber, cotton seed products, sugar, etc. Pop. 21,782.

Batoum, or BATUM (bå-töm'), a port on the east coast of the Black Sea, acquired by Russia by the treaty of Berlin, on condition that its fortifications were dismantled and it were thrown open as a free port. It rapidly grew to be the main outlet for Transcaucasia; its harbor was enlarged for alleged commercial reasons; an arsenal was built outside it; it was connected by a military road with Kars; and finally, in July, 1886, the Russian government declared it to be a free port no longer. Its importance as a naval and military station to Russia is unquestionably great, and it will probably rank in the future as one of the strongest positions on the Black Sea. The water is of great depth close inshore, and the shipping lies under protection of the overhanging cliffs of the surrounding mountains. Pop. over 30,000.

Batrachians (ba-trā'ki-anz), one of the orders in Cuvier's arrangement of the class *Reptilia*, com-

prising frogs, toads, newts, salamanders, and sirens. The term is now often employed as synonymous with amphibia, but is more usually restricted to the order Anura or tailless amphibia. See *Amphibia.*

Batshian. See *Bachian.*

Batta (bat'a), an allowance which military officers in India receive in addition to their pay. It was originally only an occasional allowance, but grew to be a constant practice, and constituted the chief part of Indian over English military emoluments.

Battalion (ba-tal'yun), a body of men arrayed for battle; specifically, a body of infantry. In the United States army as at present organized, a battalion consists of four companies under command of a major. In the British army a battalion is composed of eight companies, and is commanded by a lieutenant-colonel assisted by an adjutant. This applies to the infantry battalion. In some countries the term is extended to the organization of other branches.

Battas, a people belonging to the Malayan race inhabiting the valleys and plateaus of the mountains that extend longitudinally through the island of Sumatra. They practise agriculture and cattle-rearing, and are skillful in various handicrafts; they have also a written literature and an alphabet of their own, their books treating of astrology, witchcraft, medicine, war, etc. They are under the rule of hereditary chieftains.

Batten, Sir William, a British vice-admiral; died in 1667. During the first Civil war he acted in conjunction with Parliament, but subsequently joined the Royalists.

Battenberg (bat'en-berg), a village in the Prussian prov. of Hesse-Nassau, from which the sons (by morganatic marriage) of Prince Alexander of Hesse derive their title of princes of Battenberg. One of them, Alexander, was elected Prince of Bulgaria in 1879, but had to abdicate in 1886. Another, Henry, was married to Princess Beatrice of Great Britain in 1885, and was the father of the present queen of Spain. He died while on military duty in Africa, 1896.

Battenberg, or Renaissance Lace, a variety of handsome lace, consisting of braid arranged in a design and sewed together with linen; may contain rings as part of the design. It may be white or colored. Originated in Battenberg.

Battering-ram, an engine for battering down the walls of besieged places. The ancients employed two different engines of this kind—one a simple beam carried by the soldiers, the other suspended in a frame, often mounted on wheels. They consisted of a beam or spar with a massive metal head, and were set in motion either by a direct application of manual force or by means of cords passing over pulleys. Some were 120 feet or more in length, and worked by 100 men.

Battersea (bat'er-sē), a suburban district of London, in Surrey, on the south bank of the Thames, nearly opposite Chelsea, with a fine public park extending over 185 acres. Pop. 168,907.

Battery (bat'er-i), as a military term, (1) any number of guns grouped in position for action; (2) any work constructed as a position for such guns; (3) the tactical unit of field-artillery, more properly described as a field battery, consisting of the officers, men, horses and guns with all necessary appurtenances. In gun and howitzer batteries there are embrasures through which the firing takes place; but mortar batteries have no openings.—*In battery,* a term signifying a projecting, as a gun, into an embrasure or over a parapet in position for firing. *Cross-batteries* are two batteries which play athwart each other, forming an angle upon the object battered; an *en écharpe battery,* a battery which plays obliquely on the enemy's lines; an *enfilade battery,* a battery which scours or sweeps the whole line or length; an *en revers battery,* one which plays upon the enemy's back.

Battery, in electricity, the term formerly applied to a collection of Leyden jars; but now used of various devices for generating electricity by chemical action. These batteries are divided into two main classes—*primary,* composed of a number of galvanic or voltaic cells in which the electric current is supplied by the dissolving of one of the plates; and *secondary,* or *electric storage battery* (which see), which, unlike the primary battery, may be restored after the exhaustion of the cells, by means of an electric current passed through it from the reverse direction. Batteries are of varied construction. In that devised by George Leclanché in 1868, a solid depolarizer is employed in the shape of manganese dioxide packed with fragments of carbon into a porous pot around a carbon plate. A zinc rod constitutes the positive plate, and the exciting fluid is a solution of sal-ammoniac. The so-called *dry cells* are essentially Leclanché cells, in which the solution is present not as a liquid, but as a paste.

Battery, in criminal law, an assault by beating or wounding an-

other. The least touching or meddling with the person of another against his will may be held to constitute a battery.

Batthyanyi (bát-yán′yē), one of the oldest and most celebrated Hungarian families, traceable as far back as the Magyar invasion of Pannonia in the ninth century. Among later bearers of the name have been—COUNT CASIMIR BATTHYANYI, who was associated with Kossuth, was minister of foreign affairs in Hungary during the insurrection of 1849, and died in Paris in 1854; COUNT LOUIS BATTHYANYI, born 1809, of another branch of the family, was leader of the opposition in the Hungarian diet until the breaking out of the commotions of 1848, when he took an active part in promoting the national cause; but on the entry of Windischgrätz into Pesth he was arrested and condemned, 1849.

Battle (bat'l), a combat between two armies. In ancient times and the middle ages the battleground was occasionally chosen by agreement, and the battle was a mere trial of strength, a duel *en gros*. As the armies of the ancients were imperfectly organized, and the combatants fought very little at a distance, after the battle had begun maneuvers were much more difficult, and the troops almost entirely beyond the control of the general. Under these circumstances the battle depended almost wholly upon the previous arrangements and the valor of the troops. In modern times, however, the finest combinations, the most ingenious maneuvers, are rendered possible by the better organization of the armies, and it is often the skill of the general rather than the courage of the soldier that now determines the event of a battle. Battles are distinguished as *offensive* or *defensive* on either side, but there is a natural and ready transition from one method to the other. As a rule, the purely defensive attitude is condemned by tacticians except in cases where the only object desirable is to maintain a position of vital consequence, the weight of precedent being in favor of the dash and momentum of an attacking force even where opposed to superior forces. Where the greatest generals have acted upon the defensive, it has almost always been with desire to develop an opportunity to pass to the offensive, and having discovered their opponent's hand, to marshal against the enemy, exhausted with attack, the whole strength of their resources. Napoleon won more than one great victory by this method, and Wellington's reputation was largely based upon his skill in defensive-offensive operations. Tacticians have divided a battle into three periods: those of disposition, combat, and the decisive moment. In some measure they require distinct qualities in a commander, the intellect which can plot a disposition being by no means always of the prompt judgment passing to instant action which avails itself of the crucial moment to crush an enemy.

Battle, a town of England, county of Sussex, so named from the battle of Hastings, fought at this site. An abbey built by William the Norman has fallen into ruins, but important remains including portions of the various buildings exist; and there is an old church of great interest. Pop. 2924.

Battle (or BATTEL, WAGER OF, an obsolete method, according to English law, of deciding civil or criminal cases by personal combat between the parties or their champions in presence of the court. A woman, a priest, a man above 60, or a person physically incapable of fighting, might appear by champion.

Battle Above The Clouds, the name given to that part of the battle of Chattanooga resulting in the capture of Lookout Mountain, Tennessee, on November 24, 1863, by the Federals, who charged up the mountain through a heavy mist.

Battle-axe, a weapon much used in war in the early part of the middle ages among knights. A pole axe is a long-handled battle-axe.

Battle Creek, a city of Michigan, midway between Detroit and Chicago, 45 miles S. W. of Lansing; on both Grand Trunk and Michigan Central main lines; center of a great cereal-food industry. Here is located the Battle Creek Sanitarium, the largest of its kind in the world; and some 200 manufacturing plants, producing cereal foods, farm implements, engines, pumps, tractors, printing presses, etc. Pop. (1910) 25,267; (1920) 36,164.

Battlement, a notched or indented parapet of a fortification formed by a series of raised parts called *cops* or *merlons*, separated by openings called *crenelles* or *embrasures*, the soldier sheltering himself behind the merlon while he fires through the embrasure. Battlements were originally military, but were afterwards used freely in ecclesiastical and civil buildings by way of ornament.

Battue (ba-tü′), a method of killing game by having persons to beat a wood, copse, or other cover, and so drive the animals (pheasants, hares, etc.) towards the spot where sportsmen are stationed to shoot them.

Battus (bat'tus), the reputed founder of the Greek colony of Cyrene in Libya about 630 B. C.

Batu Khan (ba-tū' kän), Mongol ruler of the western conquests of his grandfather Genghis Khan from 1224 to 1255, devastating Russia, Poland, Hungary and Dalmatia.

Batum. See *Batoum.*

Bauan (bä-o'än), a municipality of Batangas, Luzon, Philippine Islands. Pop. 40,000. Town of same name in La Union province. Pop. 10,000.

Baudelaire (bōd-lār), CHARLES PIERRE, a French poet, born 1821. His first work of importance was a series of translations from Poe, ranking among the most perfect translations in any literature. A volume of poems, *Les Fleurs du Mal* (1857), established his reputation as a leader of the romanticists, though the police thought it necessary to deodorize them. Of a higher tone were his *Petits Poëmes en Prose;* followed in 1859 by a monograph on Théophile Gautier, in 1860 by *Les Paradis Artificiels* (opium and hashish studies), and in 1861 by *Wagner and Tannhäuser.* He died in 1867.

Baudry (bō-drē), PAUL JACQUES AIMÉ, a prominent modern French painter, born 1828, son of an artisan. He took the grand prix de Rôme in 1850, and exhibited many important works, of which the better known are his *Charlotte Corday* and *La Perle et la Vague.* The decoration of the foyer of the New Opera House at Paris was entrusted to him—an enormous work, occupying a total surface of 500 square meters, but admirably accomplished by him in ten years. Died in 1886.

Bauer (bou'er), BRUNO, a German philosopher, historian, and Biblical critic of the rational school; born in 1809; died in 1882.

Bauer, HAROLD, celebrated pianist; born in London 1873; mother, English; father, German. He was a pupil of Paderewski. His first concert tour was in Russia in 1893. He came to America in 1900 and has given many recitals since then.

Bauer, LOUIS AGRICOLA, an American magnetician, born 1865. Since 1904 director, Department of Terrestrial Magnetism, Carnegie Institute.

Bauhin (bō-aṇ), GASPARD, born at Basel in 1560; in 1582 elected to the Greek chair at Basel, and in 1588 to that of anatomy and botany. He died in 1624. His fame rests chiefly on his *Pinax theatri Botanici* and *Theatrium Botanicum.* Linnæus gave his name to a genus of plants. See *Bauhinia.* His name is given to the ileocæcal valve.

Bauhinia (bą-hin'i-a), a genus of plants, order *Leguminosæ,* usually twiners, found in the woods of hot countries, and often stretching from tree to tree like cables.

Baum (Boum), FRIEDRICH (?-1777), a German soldier in the British service who fought under General Burgoyne (q. v.) in the Revolutionary war. He was defeated by Colonel Stark and fatally wounded at the battle of Bennington (q. v.), August 16, 1777.

Baumé (bō-mā') ANTOINE, French practical chemist; born 1728; died 1804. He was the inventor of many useful industrial chemical processes.

Baumgarten (boum'gär-tn), ALEXANDER GOTTLIEB, a German philosopher, born in 1714 at Berlin; died in 1762. He wrote much on esthetics.

Baur (bour), FERDINAND CHRISTIAN, German theologian, founder of the 'Tübingen School of Theology;' born in 1792. The publication of his first work, *Symbolism and Mythology, or the Natural Religion of Antiquity,* in 1824-25, led to his appointment as professor in the evangelical faculty of Tübingen University, a position occupied by him till his death in 1860. His chief works in the department of the history of Christian dogma are: *The Christian Gnosis, or the Christian Philosophy of Religion* (1835); *The Christian Doctrine of the Atonement* (1838); *The Christian Doctrine of the Trinity and the Incarnation* (1841-43); *The Compendium of and Lectures on the History of Christian Dogmas* (1847, 1865). He wrote also a number of works relating to New Testament topics. He believed that the New Testament mainly took form in the second century, the only genuine writings previous to A. D. 70 being the four great Pauline epistles and Revelation.

Bautzen (bout'sen), or BUDISSIN, a German town in the kingdom of Saxony, upon a height on the right bank of the Spree, with some old and interesting buildings. The inhabitants are mostly Lutheran, and both Catholics and Protestants worship in the same cathedral. Chief manufactures: woolens, paper, gunpowder, machinery. Napoleon defeated the united armies of the Russians and the Prussians at Bautzen on the 21st May, 1813. Pop. 32,000.

Bauxite (bąk'sīt), a clay found at Baux, near Arles in France, also in United States, Austria, Italy and Ireland (Co. Antrim), containing a large proportion of alumina, and used as a lining for furnaces, in the preparation of

crucibles, etc. It carries from 20 to 40 per cent aluminum (q. v.).

Bavaria (ba-vā′ri-a; German, *Freistaat Bayern*), a state in the south of Germany, second largest of the German Republic. It is composed of Upper Bavaria (Oberbayern), Lower Bavaria (Niederbayern), Palatinate (Rheinpfalz), Upper Palatinate (Oberpfalz), Lower Franconia (Oberfranken), Middle Franconia (Oberfranken), Lower Franconia (Unterfranken) and Suabia (Schwaben). To these was added, in 1920, the Free State of Coburg (q. v.), making a total area of 30,819, with a population of 6,962,109. Munich is the capital. Other important towns are Nürnberg, Augsburg, Würzburg, Kaiserslauten and Ratisbon.

The main portion of the state is in most parts hilly; in the south, where it belongs to the Alps, mountainous; but north of the Alps and south of the Danube, which flows east through the country from Ulm to Passau, there is a considerable plateau, averaging about 1600 feet above the sea-level. The south frontier is formed by a branch of the Noric Alps, offsets from which project far into the plateau; principal peaks: the Zugspitze, 9738 ft., and the Watzmann, 8901 ft. The Palatinate is traversed by the northern extremity of the Vosges Mountains, and the scenery is diversified and picturesque. The greater part of the country belongs to the basin of the Danube, which is navigable, its tributaries on the south being the Iller, Lech, Isar, and Inn; on the north, the Wörnitz, Altmühl, Nab, and Regen. The northern portion belongs to the basin of the Main, which receives the Regnitz and Saale, and is a tributary of the Rhine. The Palatinate has only small streams that flow into its boundary river, the Rhine. The chief lakes of Bavaria are all on the higher part of the south plateau; the smaller within the range of the Alps. The Ammer-See is about 10 miles long by 2½ broad, 1736 ft. above the sea; the Würm-See or Starnberger-See, about 12 miles long by 3 broad, 1899 ft.; and Chiem-See, 9 miles long by 4 to 9 broad, 1651 ft. The climate in general is temperate and healthy, though somewhat colder than the other South German states; yearly average about 47°.

As regards soil, Bavaria is one of the most fertile countries in Germany, producing the various cereals in abundance, the best hops in Germany, fruit, wine, tobacco, etc., and having extensive forests. Lower Franconia (the Main valley) and the Palatinate are the great vine-growing districts. The celebrated Steinwein and Leistenwein are the produce of the slopes of the Steinberg and Marienberg at Würzburg (on the Main). The forests of Bavaria, chiefly fir and pine, yield a large revenue, much timber being annually exported, together with potash, tar, turpentine, etc. The principal mineral products are salt, coal, and iron, some of the mining works belonging to the state. The minerals worked include copper, quicksilver, manganese, cobalt, porcelain clay, alabaster and graphite. Large numbers of horses and cattle are reared, as also sheep and swine. The manufactures are mostly on a small scale. The principal articles manufactured are linens, woolens, cotton, leather, paper, glass, earthen and iron ware, jewelry, etc. The optical and mathematical instruments made are excellent. A most important branch of industry is the brewing of beer. A number of the people maintain themselves by the manufacture of articles in wood, and by felling and hewing timber. The trade of Bavaria is comparatively limited. Principal exports: corn, timber, wine, cattle, glass, hops, fruit, beer, wooden wares, etc. The chief imports are sugar, coffee, cotton, rice, spices, dyestuffs, silk and silk goods, lead, etc. From its position Bavaria has a considerable transit trade. The König Ludwig Canal connects the Main at Bamberg with the Altmühl a short distance above its embouchure in the Danube, thus establishing water communication between the North Sea and the Black Sea.

Education is in a less satisfactory condition than in most German states. There are three universities, two of which (Munich and Würzburg) are Roman Catholic, and one (Erlangen) Protestant. In art Bavaria is best known as the home of the Nürnberg school, founded about the beginning of the sixteenth century by Albert Dürer. Hans Holbein is also claimed as a Bavarian; and to these have to be added the eminent sculptors Kraft and Vischer, both born about the middle of the fifteenth century. The restoration of the reputation of Bavaria in art was chiefly the work of Ludwig I (1825-48), under whom the capital became one of the most prominent seats of the fine arts in Europe. Formerly the Roman Catholic Church was supported by the state, but the constitution of 1919 provided for the separation of church and state. All citizens, whatever their creed, possess the same civil and political rights. The dioceses of Bavaria comprise two R. C. archbishoprics, Munich and Bamberg; and six bishoprics, Augsburg, Ratisbon, Eichstädt, Passau, Würzburg, and Spires.

Prior to the establishment of the Republic (1918) the executive power was vested in the king, whose crown was

hereditary in the male line. The legislature consisted of two chambers: the Senate, composed of princes, archbishops and others; the Chamber of Deputies, 163 in number, elected for three years by direct vote. The voting franchise was restricted by a property qualification. The constitution of the Republic (1919) provided for a single chamber, elected by universal suffrage.

History.—The Bavarians take their name from the Boii, a Celtic tribe whose territory was occupied by a confederation of Germanic tribes, called after their predecessors Boiarii. These were made tributary first to the Ostrogoths, and then to the Franks; and on the death of Charlemagne his successors governed the country by lieutenants with the title of margrave, afterwards converted (in 921) into that of duke. In 1070 Bavaria passed to the family of the Guelphs, and in 1180 by imperial grant to Otho, Count of Wittelsbach, founder of the dynasty. In 1623 the reigning duke was made one of the electors of the empire. Elector Maximilian II joined in the war of the Spanish succession on the side of France, and this led, after the battle of Blenheim, 1704, to the loss of his dominions for the next ten years. His son, Charles Albert, likewise lost his dominions for a time to Austria, but they were all recovered again by Charles's son, Maximilian III (1745). In the wars following the French revolution Bavaria was in a difficult position between France and Austria, but finally joined Napoleon, from whom its elector, Maximilian IV, received the title of king (1805), a title afterwards confirmed by the treaties of 1814 and 1815. King Maximilian I was succeeded by his son, Ludwig (or Louis) I, under whom various circumstances helped to quicken a desire for political change. Reform being refused, tumults arose in 1848, and Ludwig resigned in favor of his son, Maximilian II, under whom certain modifications of the constitution were carried out. At his death in 1864 he was succeeded by Ludwig II. In the war of 1866 Bavaria sided with Austria, and was compelled to cede a small portion of its territory to Prussia, and to pay an enormous war indemnity. Soon after Bavaria entered into an alliance with Prussia, and in 1870 joined the Zollverein. In the Franco-German war of 1870-71 the Bavarians took a prominent part, and it was at the request of the King of Bavaria, on behalf of all the other princes and the senates of the free cities of Germany, that the King of Prussia agreed to accept the title of Emperor of Germany. The eccentricity early displayed by Ludwig II developed to such an extent that in June, 1886, he was placed under control, and a regency established under Prince Luitpold (Leopold). On December 12, 1912, Prince Luitpold's son, Prince Ludwig Leopold, succeeded to the regency, and on November 9, 1913, became king, taking the title of Leopold III; abdicated 1918.

Since January, 1871, Bavaria has been a part of the German Federation. It remained a kingdom until 1918, when, following the European war (q. v.) the various monarchies composing the German Empire became republics. On November 22, 1918, Bavaria was declared a republic and the dynasty deposed. For a time the extreme socialists took control of affairs during the revolution (see *Germany*), and Kurt Eisner, the socialist leader, became President. Following his assassination, February, 1919, the Moderates came into power and a stable government was formed. The constitution, dated August 14, 1919, established the Free State of Bavaria. There is one chamber, and suffrage is universal. Bavaria sends seven members to the German Reichsrat.

Bawian (bä-we'an), an island, Dutch East Indies. Pop. 33,000.

Baxter, JAMES PHINNEY, American historian, born 1831; mayor of Portland, Me., 1893-97, 1905-05.

Baxter (baks'tẽr), RICHARD, the most eminent of the English nonconforming divines of the seventeenth century, born at Rowton, Shropshire, in 1615; ordained in 1638; parish minister of Kidderminster in 1640. The imposition of the oath of universal approbation of the doctrine and discipline of the Church of England (the *et cætera oath*) detached him from the establishment. He then condemned the execution of the king and the election of Cromwell, preached against the Covenant and against separatists and sectaries, but his piety won him the respect of all parties. At the Restoration he became king's chaplain, but declined the bishopric of Hereford, and on the passage of the Act of Uniformity threw in his lot entirely with the nonconformists. In 1685 he was arrested, fined 500 marks by Jeffreys, and imprisoned. After his release he lived in retirement till his death in 1691. He left about 150 treatises, of which his *Saints' Everlasting Rest* and *Call to the Unconverted* have been the most popular.

Baxterians, followers of Baxter in respect of his attempted compromise between Calvinism and Arminianism. They reject the doctrine of reprobation, admit a universal potential salvation, becoming actual in the case of the elect, and assert the possibility of

falling from grace. Exponents: Dr. Watts and Dr. Doddridge.

Bay (bā), the laurel-tree, noble laurel, or sweet-bay (*Laurus nobilis*); but the term is loosely given to many trees and shrubs resembling this. A fatty or fixed oil (used in veterinary medicine) and also a volatile oil is obtained from the berries, but what is called 'bayberry oil' is also obtained from the genus *Myrica* or candleberry. In United States the fragrant-flowered *Magnolia glauca* is called sweet bay, the red bay being *Laurus carolinensis*, the loblolly-bay *Gordonia lasianthus*. See *Laurel*.

Bay, in geography, an indentation of some size into the shore of a sea or lake, generally said to be one with a comparatively wider entrance than a gulf.

Bay, in architecture, a term applied to a recessed division or compartment of a building, as that marked off by buttresses or pillars.

Baya (bā'ya), the weaver-bird (*Ploceus philippinus*), an interesting East Indian passerine bird, somewhat like the bullfinch. Its nest resembles a bottle, and is suspended from the branch of a tree, often over water, where they are safest from monkeys and snakes. The entrance to the nest is a hole at one side. Sometimes the male builds a separate nest for himself.

Bayaderes (bā-a-dērz'), the general European name for the dancing and singing girls of India, some of whom are attached to the services of the Hindu temples, while others travel about and dance at entertainments for hire. Those in the service of the temples are recruited from the Vaisya class, while the others (Nautch girls) are low-caste or slave girls.

Bayamo (bå-yä'mō), or St. Salvador, a town in the east of Cuba, near the Cauto: pop. (1907) 4102.

Bayard (bå-yär), Pierre du Terrail, Seigneur de, the *Chevalier sans peur et sans reproche* ('knight without fear and without reproach'), born in 1476 in chateau Bayard, near Grenoble, in southern France. At the age of eighteen he accompanied Charles VII to Italy, and in the battle at Fornova took a standard. At the beginning of the reign of Louis XII, in a battle near Milan, he entered the city at the heels of the fugitives, and was taken prisoner, but dismissed by Ludovico Sforza without ransom. He was the hero of a celebrated combat of thirteen French knights against an equal number of Germans. On one occasion it is said that, singlehanded, he made good the defence of the bridge of the Garigliano against 200 Spaniards. He distinguished himself equally against the Genoese and the Venetians, and, when Julius II declared himself against France, went to the assistance of the Duke of Ferrara. He was severely wounded at the assault of Brescia, but returned, as soon as cured, to the camp of Gaston de Foix, before Ravenna, and after new exploits was again dangerously wounded in the retreat from Pavia. In the war commenced by Ferdinand the Catholic he displayed the same heroism, and the fatal reverses which embittered the last years of Louis XII only added to the personal glory of Bayard. When Francis I ascended the throne he sent Bayard into Dauphiné to open a passage over the Alps and through Piedmont. Prosper Colonna lay in wait for him, but was made prisoner by Bayard, who immediately after further distinguished himself in the battle of Marignano. After his defence of Mézières against the invading army of Charles V he was saluted in Paris as the savior of his country, receiving the honor paid to a prince of the blood. His presence reduced the revolted Genoese to obedience, but failed to prevent the expulsion of the French after the capture of Lodi. In the retreat the safety of the army was committed to Bayard, who, however, was mortally wounded by a stone from a blunderbuss in protecting the passage of the Sesia. He kissed his sword's cross, confessed to his squire, and died April 30, 1524.

Bayard (bī'ard), Thomas Francis, statesman, born at Wilmington, Delaware, in 1828, educated at Flushing, studied law, and in 1868 was elected to the United States Senate, where he served till 1884. In 1885 he was made Secretary of State in President Cleveland's cabinet, and on March 30, 1893, was appointed ambassador to England being the first ambassador from the United States, only ministers being appointed previously. He died in 1898.

Bay City, a city, county seat of Bay Co., Michigan, on Saginaw River, near its mouth. It is on several railroads and has boat communication with lake ports. Its industries include coal, chemicals, lumber, boats, cranes, auto bodies, motor trucks, transformers, go-carts, etc. It is the home of the 'ready-cut house' business with four large companies operating here. Pop. (1910) 45,166; (1920) 47,554.

Bayeux (bå-yeu), an ancient town of France, dep. Calvados, 16 miles N. W. of Caen, with manufactures of lace, calico, and porcelain. In its cathedral, said to be the oldest in Normandy,

was preserved for a long time the famous Bayeux tapestry.

Bayeux Tapestry, so called because it was originally found in the cathedral of Bayeux, France, in the public library of which town it is still preserved. It is supposed to have been worked by Matilda, queen of William the Conqueror, and to have been presented by Odo, Bishop of Bayeux, the half-brother of William, to the church in which it was found. It is 230 feet in length and 20 inches in breadth, and is divided into seventy-two compartments, the subject of each scene being indicated by a Latin inscription. These scenes give a pictorial history of the invasion and conquest of England by the Normans, beginning with Harold's visit to the Norman court, and ending with the flight of the English at the battle of Hastings.

Bayle (bāl), PIERRE, French critic and miscellaneous writer, the son of a Calvinist preacher, born at Carlat (Languedoc) in 1647, died at Rotterdam 1706. He studied at Toulouse, and was employed for some time as a private tutor at Geneva and Rouen. He went to Paris in 1674, and soon after was appointed professor of philosophy at Sedan. Six years after he removed to Rotterdam, where he filled a similar chair. The appearance of a comet, in 1680, which occasioned an almost universal alarm, induced him to publish, in 1682, his *Pensées Diverses sur la Comète*, a work full of learning, in which he discussed various subjects of metaphysics, morals, theology, history, and politics. It was followed by his *Critique Générale de l'Histoire du Calvinisme de Maimbourg*. This work excited the jealousy of his colleague, the theologian Jurieu, and involved Bayle in many disputes. In 1684 he undertook a periodical work, *Nouvelles de la République des Lettres*, containing notices of new books in theology, philosophy, history, and general literature. This publication, which lasted for three years, added much to his reputation as a philosophical critic. In 1693 Jurieu succeeded in inducing the magistrates of Rotterdam to remove Bayle from his office. He now devoted all his attention to the composition of his *Dictionnaire Historique et Critique*, which he first published in 1696, in two vols. fol. This work, much enlarged, has passed through many editions. It is a vast storehouse of facts, discussions, and opinions, and though it was publicly censured by the Rotterdam consistory for its frequent impurities, its pervading scepticism, and tacit atheism, it long remained a favorite book both with literary men and with men of the world.

Bay-leaf, the leaf of the sweet bay or laurel-tree (*Laurus nobilis*), These leaves are aromatic, and are used in cookery and confectionery. See *Bay*.

Bayley (bā'li), JAMES ROOSEVELT, an American prelate of the Roman Catholic Church, born in New York, Aug. 23, 1814; died at Newark, N. J., Oct. 3, 1877. He graduated at Trinity (then Washington) College, Hartford, and entered the ministry of the Protestant Episcopal Church. In 1842 he became a Roman Catholic, and was ordained priest two years later. He was professor of belles-lettres and later active president of St. John's College, Fordham, and was consecrated Bishop of Newark, N. J., in 1853; Archbishop of Baltimore, 1872. Author of *History of the Catholic Church on the Island of New York*.

Bayliss (bā'lis), SIR WYKE (1835-1906), an English artist, born at Madeley. He succeeded Whistler as president of the Royal Society of British Artists in 1888. His paintings include 'St. Mark's, Venice;' 'The Golden Duomo, Pisa;' 'St. Peter's, Rome,' etc.

Baylor (bā'lor), FRANCES COURTENAY (Mrs. George S. Barnum), an American author, born at Fayetteville, Ark., in 1848. Her novels include *Behind the Blue Ridge*, *Juan and Juanita*, etc.

Baylor, ROBERT EMMET BLEDSOE (1793-1874), an American jurist and philanthropist, born in Lincoln Co., Ky. Admitted to the bar in Kentucky, he removed to Alabama, and later to Texas, where he was a district judge for 25 years. He liberally supported a Baptist college, which subsequently became Baylor University (q. v.).

Baylor University, a Baptist co-educational institution at Waco, Texas, founded originally at Independence in 1845, removed to Waco in 1886. It also has schools of medicine and pharmacy at Dallas.

Bayly (bā'li), THOMAS HAYNES (1797-1839), an English song-writer and author, born at Bath. Among his popular songs were 'Isle of Beauty,' 'We Met—'Twas in a Crowd,' 'I'd be a Butterfly,' etc. He also wrote *Perfection*, a play; *The Aylmers*, a novel; and various short stories.

Baynes (bānz), THOMAS SPENCER (1823-87), an English author, born in Somersetshire. From 1857 to 1863 he was assistant editor of the London *Daily News*, and professor of logic and rhetoric at St. Andrews University, 1864-87. Author of *The New Analytic of Logical Form*, etc.

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